University of Alberta

Teachers' Perspectives of Online Education in Alberta

by

William Dewey Muirhead ©

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in partial fulfillment of the requirements for the degree of
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in

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Abstract

This study examined these matters: (a) the emerging issues associated with online teaching and learning in Alberta; (b) the development of online course content; (c) how teachers understood and planned for online interaction, learning activities, and assessment; and (d) the influence of professional factors.

Thirteen teachers from four online schools in four school jurisdictions participated in this study. They worked from home, in schools or in office buildings. Onsite visits with these teachers were arranged to allow for personal observations and discussions about online teaching course materials and course development. Semi-structured and open-ended questions were employed to provide maximum opportunities for exploration of topics of mutual interest.

Online teachers reported evolving professional responsibilities in authoring online courses, providing technological support to students and parents, and continually enhancing technological skills, while teaching full-time. Consequently, workloads were substantially increased. The complexity of the content development process, instructional design philosophies, content development tools, and rapid adoption of integrated online delivery tools created time pressures among teachers.

Online education in Alberta is characterized by more extensive interaction with parents than in traditional classrooms. In some schools, parents assumed responsibility for supervision of students' tests and examinations. However, teachers desired improvement in their interactions with students. Evaluation of online students' work also created concern.

While teachers' attitudes towards technology were positive, frustration between vision and current reality, the reliability of computer technology, and inadequate bandwidth tempered teachers' unconditional support for technology. All 13 teachers viewed technology as a tool to enhance student learning rather than a panacea for the challenges of education.

Recommendations for practice and research are related to enhancement of teachers' professional practices, improved professional development opportunities, better online orientation materials for students, and better online instructional design models.

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The undersigned certify that they have read, and recommended to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Teachers' Perspectives of Online Education in Alberta" submitted by William Dewey Muirhead in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Administration and Leadership.

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Chapter 1

Overview of the Study

Introduction

The emergence of online education as an educational option is a recent phenomenon. Beginning in 1995, 23 schools in Alberta now offer options for online education. Online education refers to formal educational opportunities for students where the student is separated from the teacher by geographic distance and where interaction between teacher and students is mediated through the use of computer technology. This definition of online education is derived from a more generic description of distance education provided by Haughey (1990). The use of computer technology differentiates this specific type of distance education from other formats.

Online education developed within the rich context of distance education in Alberta (Haughey & Muirhead, 1999). Beginning in 1923, with a request from an isolated farm family for home schooling lessons for its children, distance education--then known as "correspondence education"--expanded in Alberta. In this approach, communication between student and teacher was asynchronous and occurred via the postal system. As new technologies became available they were adopted to provide enhanced educational opportunities for distance-education students. In the 1930s, radio was used to broadcast lessons to remote students and their families. During the 1960s, as television became more widely available, educational programs were broadcast to students in schools and at home across Canada (Rosen, 1968).

The fax machine was adopted in the 1980s to facilitate the exchange of assignments and lessons between students and teachers. Also, during the 1980s audio-conferencing became a popular means of mediating communication between student and teacher and between groups of students and a single teacher. School jurisdictions at that time took responsibility for the provision (delivery, support, marking, and tutoring) of distance education for their own students, while course development remained within Alberta Education. Today, while this eclectic mix of old and new technologies is still evident throughout Alberta, there is interest in online programs as the means of meeting the needs of remote, home-schooled, or disparate students for whom attendance at site-based schools presents difficulties. Unlike other forms of distance education which rely predominately on mass media (often print-based), online education depends on new network technologies--such as the Internet--for communication.

The Internet allows instructors to post lessons and course assignments to a central server which students can access at any time. It also allows instructors and students to use information provided at other sites on the Internet. In addition, the use of computer technology and the Internet facilitates asynchronous communication and--more recently synchronous communication--between instructor and students through the World Wide Web. The emergence of widespread use by students and teachers of the Internet has greatly accelerated the growth of online education.

However, in Cuban's (1986) view, the application of technology to education has always produced implementation problems. Often technology has been seen as the solution to many of education's problems. Yet, as Cuban has pointed out, the application of technology to education has had little effect on core educational practices. In terms of online education, the Internet has given online students greater access to increasingly diverse and varied materials previously unavailable in print-based, distance-education courses and more frequently access to teachers. After grading assignments received electronically, teachers can return assignments more quickly than with previous technologies. Rather than teachers and students waiting days or weeks to exchange or react to questions or assignments, the Internet allows faster and potentially immediate communication through e-mail. Current forms of online education have been heavily influenced by the application of network technologies to teaching and learning, but it remains unclear how the metamorphosis from traditional correspondence education to online education has occurred and how this has affected the lives of both teachers and students.

Definitions

Online education is a recent phenomenon within the public K-12 education sector in Alberta, and indeed across Canada. Rather than occurring in an actual synchronous face-to-face environment, online education occurs virtually and most often asynchronously through the use of information and communications technologies (ICT). Haughey (1990) defined distance education as "the provision of formal educational opportunities to students, [who] using specifically prepared materials, have major responsibility for their own learning and submit their work for marking and assistance to a teacher who is not present during the learning" (p.1). While Haughey suggested that the roles and responsibilities of students are rewritten in a distance education environment, obviously the roles and responsibilities of the teacher are also altered. Holmberg (1981), focusing upon the role of the teacher, defined the practices of teachers in distance education as " those teaching methods in which because of the physical separateness of learners and teachers, the interactive as well as the preparatory phrase of teaching is conducted through print" (p.16).

The use of print as the primary form through which communication occurs in correspondence education is well documented (e.g., Tesarowshi, 1984) and contrasts with synchronous oral communication patterns found in classroom settings. Online education uses text to convey course content. In some settings, it also makes use of oral communication through the use of old and new electronic technologies. The use of the telephone, Internet audio-files, and group text and audio-based software such as Symposium® or Learnlinc® have expanded options for "real time" communication. This multiplicity of communication options has made the making of decisions--both about how best to communicate with students and which types and extent of interaction to use--more complex for teachers than in either face-to-face or correspondence environments.

Other authors have viewed online education in terms of its uniqueness and its fundamental break with traditional educational practices (McGreal 1998; Mehlinger 1995). Authors such as Stahlke and Nyce (1996) have challenged the notion that education, is by default, a face-to-face encounter: "rather than assume, as most high school and postsecondary teaching models do, that the default model is the lecture hall, one must question 'What the lecture is appropriate for'" (p. 4). Educators such as Mehlinger (1995) have discussed current efforts directed towards educational reform within the content of online learning and the application of technology to teaching and learning in the K-12 sector. Mehlinger stated that "information age technology is the single greatest factor affecting the way we live; it cannot help but alter the way we conduct schooling" (p. 21). Still other authors such as Collis (1996) viewed the emergence of online education as "making connections among persons and resources through communication technologies for learning related purposes" (p. 9). The beginning point from which to view online education is to acknowledge that online education can take place in different ways, in different settings, with or without the active participation of a teacher, with different sorts of organizational structures, and with using various pedagogical and philosophical approaches.

Other definitions of distance education attempt to capture the emerging use of new technologies in distance education. For example, Moore and Kearsley (1996) defined distance education as

> planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements. (p. 2)

In this study the term online education denotes the processes involved when new information and network technologies such as the Internet are used to make connections among students, teachers, students, and educational materials. "Virtual schooling" is the term used by Alberta Learning and by many online schools to denote the provision of "online" instructional processes. I have chosen the broader term online education since in many instances the educational process does not replicate those used in traditional schools.

While multiple views exist about how the emergence of online education may fit within existing knowledge bases or within existing efforts at reforming the education system, it is important to acknowledge that educational processes, and the systems necessary to support learning, are altered in online education. These are the foci of this study. However, this study does not include use of technology within the classroom unless it involved its use by students who were taking online education.

Regulations

There are no specific regulations pertaining to online schools in Alberta. Regulations concerning the operation of online schools are identical to those for schools operating within a "brick and mortar" environment. The term "school" is used throughout this study to denote both programs where online education was offered as a program from an existing jurisdictional setting or to denote a school under the definition applied by Alberta Education. The name "Alberta Education" will be used in this thesis when referring to the Ministry of Education in Alberta prior to the amalgamation of Alberta Education and Alberta Advanced Education and Career Development in a government re-organization which took place in May 1999.

Alberta Learning (1999) in an internal document prepared for parents across Alberta, defined an online learning program as "a structured learning environment offered by a school authority where students access educational programs electronically." Moreover, the view that online learning is similar to face-to-face education is reinforced by the notion that "online education programs provide the same learning content to students but students receive it in a different way." This internal document and government regulations contained in the School Act have reinforced the notion from Alberta Learning that online schools will be held to the same accountability levels as "traditional schools." When referring to reports or policies after that date, "Alberta Learning" will be used.

Parental Involvement

With respect to parental involvement, Snyder (1997) has pointed out that parents have expressed interest in exploring innovative approaches to the education of their children. In Alberta, some parents have demanded greater choice in the types and structures of education programs available for their children. Rural parents have also demanded equal access to the educational services offered in urban locations.

Moreover, parents have requested greater input into the selection of course content and have sought greater control over how their children are to be educated. One manifestation of this trend is the growing number of families who have removed their children from the traditional education system and chosen home schooling. Alberta Education (1998) reported that 6,064 students were home-schooled in 1997/98, down from 6,287 in the 1996/97 school year. However, the numbers of students in blended programs--programs where students take some combination of their education at home and in connection with some formal educational setting--increased from 1,740 to 2,346 from the 1996/97 to 1997/98 school years. During the same period the greatest change in non-traditional schooling was in online education where student enrolment increased from 596 to 1,700. Recent research by Gamble (1998) and Haughey and Muirhead (1999) has indicated that more than 4,000 students are currently enrolled in online programs in Alberta.

The discrepancy in statistics between those reported by Gamble (1997) Alberta Education (1998), Haughey and Muirhead (1999), and stems from the differences in how students are coded by local jurisdictions when reporting to Alberta Learning. These differences originate in problems of identification. Some jurisdictions report only full-time online students, while other jurisdictions report student numbers based upon total students (full-time and part-time) enrolled in online education rather than only students enrolled full-time. In-depth discussions with officials from Alberta Learning's Regional Office and Information Services (personal communication, November 1999) suggested that the identification of students as online, regular, blended, or home-schooled has more to do with funding than with instructional platform. One official stated, "jurisdictions code for money" rather than thinking about instructional policy when reporting student numbers to the government. Yet, the latest figures concerning online, blended, and home education reported by the Educational Information Services of Alberta Learning (Table 1) indicate rapid growth among online school students in Alberta.

Table 1

Online School Enrollments in Alberta 1996-1999

School year	Home Education (Blended) Students	Home Education Students	Online Students
1996/1997	1740	6308	596
1997/1998	2346	6086	1700
1998/1999	1436	6483	3615

Source: Alberta Learning personnel (1999).

Online education continues to be influenced by the demand for education services by students whose geographic location does not allow them to access a complete range of educational services. Some students live in isolated rural locations and cannot attend school because of the distance between home and school. Still others attend small schools which cannot offer specialized courses. In some situations, these schools cannot offer courses at times or in cycles that meet the needs of individual students. This mismatch between the demand for advanced courses and the inability of local jurisdictions to offer advanced courses may partly explain the growth of interest in online education.

Wynne (1997) observed that while the demand for online programs has grown in Alberta, information about this newly emergent form of distance education has not kept pace with its growth. Little information has been collected concerning the operation, management, or organization of online programs across Alberta. Also, few conceptual models exist pertaining to K-12 online instruction in Canada. Issues such as interactivity, learner independence, and instructional practices remain to be examined. In view of these developments, a pressing need existed to undertake research and to gather data about online programs across Alberta.

Purpose of the Study

This study documents the extent of online education in Alberta and explores emerging issues associated with online teaching and learning. Specifically, this study examined emerging instructional patterns in online programs, the practices of online teachers, and issues and tensions arising from online education. It also investigated what influences teachers when developing online course content; how teachers come to understand and plan for interaction, learning activities, and assessment; and how decisions about instruction have been influenced by personal and professional factors. A central goal of this research was to identify practices in online education which teachers believe contribute to effective online teaching and learning.

Commentators on online education have identified a desire on the part of educators for more "interaction" in course content and enhanced interactivity between instructors and students in online programs (e.g., Eastmond, 1998; Emerson & Hunter, 1998). Emerson and Hunter suggested that this desire for more interactivity is based on a belief system arising from educators' familiarity with site-based learning. High levels of interaction have also been associated with high completion rates and more motivated learners (Hough 1992). Topics such as how interactivity is planned, and how it is encouraged between student, teacher, and content were examined in this study through document analysis, semi-structured interviews, and on-site observations.

Many aspects of online course content have generated debate throughout Alberta. Unlike course content which teachers develop for traditional classroom environments that relies for the most part on print, online content offers the opportunity for the development of new expanded forms of course content (multiple media types, multiple sources, and varied options for instruction) that can harness the power of the Internet to facilitate new instructional practices. The extent to which teachers have been successful in developing new types of course content, which support the approved Alberta curriculum while displaying innovative instructional patterns, is unclear. How teachers have practiced online education and how they have come to understand online instructional practices requires examination. The study examined how online teachers plan for and use Internet resources and how they integrate these with print and other media-based learning components. Issues concerning how Internet sites are chosen by teachers and used by students were examined to identify current practices and to form a basis for recommendations for online education in the future.

One of the stated aims of a number of online programs is to develop course content that enables educators to individualize instruction to meet students' particular strengths and interests. How successful online educators have been in achieving this goal is unclear. Further, few research studies have examined how teachers plan for increased individualization within online education and whether the desire for greater individualization has been successful. Therefore, issues surrounding how online teachers plan for individualized instruction, and whether such efforts have met with success were examined in this study.

Finally, data are scarce about the professional practices of teachers working in online programs. How are professional practices altered in online education? How does online teaching alter the traditional practices of content development, instruction, professional development, and the working environment for teachers in online education? Additional responsibilities for content development and the application of technology to learning alter traditional practices of teachers. New responsibilities raise issues of compensation, professional development practices, teacher workloads, and professional evaluation, which require research to provide information about the extent to which online education has affected the lives of teachers.

In summary, the recent emergence of online education in Alberta presented a unique opportunity to document the development as perceived by teachers. This study provides findings which practitioners can draw upon when making decisions about online education.

Major Research Question

The central question of this study was stated as follows: What can be learned about online education from examining the work experiences of online teachers in Alberta?

Specific Research Questions

The following specific research questions were addressed in this study:

1. What are the experiences of teachers who are teaching online?
2. How do teachers understand these experiences in terms of their professional lives?
3. What content and instructional choices do teachers make concerning teaching online and why do they make these choices?
4. How do online teachers view their responsibilities for development of online courses?
5. What instructional patterns (for example, group, individual, or parent-mediated) are associated with online education?
6. What issues and tensions emerge from teachers' involvement in online education?

Rationale for the Study

Online education is attracting attention as a viable educational option within Alberta and across Canada. The research base from which decisions about online education are made by teachers is small. This thesis built upon earlier research (Haughey, 1990; Haughey & Muirhead, 1999; Wynne, 1997) concerning the convergence of distance education, educational reform, and the application of computer technology to teaching and learning. This research was expected to assist educational decision-makers to better understand the challenges and issues associated with online education with the goal of improving online education. Information gathered from online practitioners in online education should help to improve teaching and learning in this setting. This study has contributed to a developing body of knowledge about online teaching and learning with the goal to better prepare teachers to make informed decisions in practices concerning online education.

Organization of the Thesis

The thesis is organized into nine chapters. This chapter has examined the historical context which has contributed to the emergence of online education in Alberta. The aims and purpose of this study and the specific research questions are also identified.

Chapter 2 reviews the relevant literature about online K-12 education, online postsecondary education, the evolution of distance education based upon the mail to the introduction of computer-mediated communication, instructional design and the theoretical foundations underpinning online instruction which shape the context of the study and its findings.

Chapter 3 describes the method used in this study, the study design, the processes for analyzing data, the assumptions, delimitations and limitations.

Chapters 4 through 7 present the findings of the research pertaining to the personal perceptions of online teachers concerning their current environment and practices of online education. A section is included at the end of each findings chapter outlining recent developments which occurred after the original data were collected in the first six months of 1999.

The final chapter presents an overview of the study, a summary discussion of the findings, general themes, implications, recommendations for practice and further research, and personal reflections.

Chapter 2

Literature Review

Introduction

To examine the emergence of online education, three topic areas of knowledge were reviewed. First, the historical and current context within Alberta is described. Second, recent efforts to apply computer technology to teaching and learning are explored. Third, the area called "online education and technology," which includes how online teachers come to understand teaching and learning within the emerging technological environments of current online teaching, is examined. Fourth, teachers' beliefs about content development and their teaching practices are described given the emergent nature of online education. There is consequently a deficiency in the research literature pertaining to the K-12 sector. As a result, allied literature from the postsecondary sector were liberally drawn upon to provide a wider literature base and context for computer-mediated communication and learning at a distance.

Historical and Current Context of Online Education in Alberta

Alberta began as a province in 1905 and saw substantial immigration in the early years of the century. The large distances, primitive road systems, many impassable in winter meant that the provision of education was dependent on access to a local school at a time when families were often unable to afford education taxes to support the teacher. Correspondence education was the alternative for many.

In general terms, correspondence education encompasses the exchange of pre-prepared lessons between a learner and teacher. UNESCO (1979) defined correspondence education as "education conducted by the postal services without face-to-face contact between teacher and learners" (p.1). A recent publication by the Alberta Distance Learning Centre (1998) also defined correspondence education as encompassing the use of the postal system for communication with no face-to face-interaction between teacher and student. Teaching occurs through written or tape-recorded audio and video materials sent to the learner. Progress is monitored through written or taped exercises sent from the learner to the teacher, who corrects the assignment and returns it to the learner. The exchange of materials between learner and teacher is mediated through the use of a number of technologies. Historically, the postal system was used for transmission

Distance education in Canada began in 1919 in British Columbia with a farm family's request for home study lessons for its school age children (Haughey 1990). In Alberta, a similar request for lessons by mail in 1923 resulted in the Ministry of Education hiring a teacher to prepare lessons, which were mailed to the family. This original request led to requests from other rural families whose children were unable to attend school. The move towards offering educational services through correspondence education to rural families occurred not only in Alberta but also across Canada with Saskatchewan initiating correspondence courses in 1925, Ontario in 1926, and Manitoba in 1927. Initially correspondence education was envisioned as a service to rural and isolated families seeking educational services. J. T. Ross, Deputy Minister of Education for Alberta, described correspondence education in 1924 as "pre-prepared materials or readers with instructions for families on how to conduct the work of education to their children" (Ross, 1924, p. 27). Within the first year, 350 students were receiving education through correspondence (McNally, 1925). The resulting demands for lessons by mail resulted in the establishment in 1927 of the Correspondence Course Branch within the Alberta Department of Education.

However, as access to school-based rural education became more common in Canada and migration from rural to urban areas in Canada increased, the focus of correspondence education expanded to include adult upgrading and the development of specialized courses to students in small rural schools who lacked access either to courses at advanced levels or to courses which did not attract enough students. Specialized courses were difficult to offer in small schools where either limited numbers of students were available to enroll in specialized classes or students lacked the necessary academic background to undertake their study.

Additionally, problems of scheduling courses and a shortage of specialist teachers resulted in students who were unable to meet university entrance requirements. A concern for equitable access to education services throughout the province resulted in the establishment of a government Task Force in 1987 to review the operation of the Alberta Correspondence School (ACS) and to seek ways to provide greater access to educational opportunities throughout rural Alberta. The resulting report --"*Basic Learning at a Distance: Building New Partnerships*" (Alberta Education, 1987)-- suggested that alternative technologies (fax, telephone, electronic mail, and media resources) could provide some of the means by which a wider range of educational services to rural Alberta would be available. Acting on the recommendations in the report, new pilot initiatives were implemented including programs such as "Distance Learning in Small Schools" and "Distance Learning Project North" in 1987 and 1988. In each case, new technologies were used to support learning and were a precursor to current efforts in online education.

The decision to adopt technology to augment traditional correspondence education built on the successful use of technologies during the preceding years. Beginning in the 1940s, science kits with appropriate materials were included in correspondence science courses. In the 1970s audio-tapes were added to English and second-language courses, and video materials were added in the 1980s to augment printed materials except in science. A key addition to the application of fax technology to distance education in the 1980s was the hiring of local tutor markers to provide support and ongoing interaction with students. Use of tutor markers attempted to improved the interaction between student and educator, to reduce the length of response time to student questions, and to provide a faster return of completed assignments (Hough, 1992).

Correspondence education programs have recently begun to move away from paper-based independent study programs towards increased delivery of educational programs by digital means. Beginning in 1997, the Alberta Distance Learning Centre (ADLC) offered online programs through its ADLC Online Program. The intent of ADLC Online educators was to move away from print material and mail-based asynchronous communication towards a teacher-mediated model of instruction where teachers and students could communicate through e-mail and exchange assignments online. Beginning in 1998, ADLC developed a pilot program to assist small schools that wished to retain their high school students but could not offer complete secondary programs. The program emphasized teacher-student interaction through regular e-mail contact. The exchange of assignments and instructional materials was facilitated through use of the Internet.

A central reason for moving to a mediated online environment was the belief that a teacher-mediated online instructional model would improve completion rates. Traditionally, completion rates among correspondence courses where students were left to study independently had been low (Balay, 1978). While completion rates have been slowly rising over the past 10 years (personal communication with the Principal of ADLC), anecdotal evidence indicates that completion rates rose more quickly when students and teachers established a close working relationship. Results from Learning Project North and Distance Learning in Small Schools Project found that rates rose sharply when students felt a connection or relationship to a teacher/coordinator (Clark & Haughey 1998; Clark & Schieman, 1988, 1990; Gee 1991). These projects demonstrated that where teachers and students could interact regularly, where communication was prompt, and where student and teachers could build relationships mediated by technology, completion rates and student success rose to over 80%. The challenge of these findings was that while school jurisdictions could use these strategies to enhance their distance education offerings and raise completion rates, it was much more difficult for ADLC to implement the reports discussed above.

Gee's (1991) review of the state of distance education in Canada indicated that use of technology to mediate communication between instructor and student would likely follow the adoption cycle which began with the postal system during the 1920s. The history of education at a distance has been and continues to be one of seeking ways to bridge the psychological distance between learner and instructor (Moore 1990). Online education is another interpretation of the quest for equitable educational opportunities for students who are separated from site-based learning environments. Distance education programs will continue to migrate to online environments to ensure quality learning opportunities for students (Berge,1998). Online as an emerging form of education will transcend the accepted boundaries of distance and home schooling. The notion of school as a place away from the home and education as an activity which is separated from home are notions which must be reexamined.

In the view of Cutler-Loss and Cutler-Loss, (1995) home-schooling refers to some variation of an arrangement in which "the parent(s) becomes primarily responsible for educating his or her child(ren)" (p.166). They pointed out that at one time much education was conducted within a home environment. After many decades of declining interest in home-schooling, a renewal of interest in new methods and supports for schooling at home is evident. Recent research by Snyder (1997) suggested that home-schooling parents view the emergence of online programs as particularly important when they feel that they lack the necessary academic skills to continue acting as the primary instructor in their children's education. Snyder's findings point to a link between home-schooling and the growth of online education. Parents who wish to educate their children at home, yet still want some ongoing instructional support from school jurisdictions, can be supported by online teachers.

Recent Developments in Online Education in Alberta

During the last four years at least 23 online programs have commenced operation in Alberta. Recent research conducted by Haughey & Muirhead (1999), in partnership with Alberta Education, provided background data to inform further examination of online education. Data from this study pointed out the diversity of professional practices and the challenges which teachers were facing in attempting to move from face-to-face teaching to online education. An examination of web-based documents from online schools, print-based information supplied by online programs to the public, publicly available information from Alberta Education, personal communications with Alberta educators, and findings from other research studies were used to establish a base-line reference for the emergence of online education in the province.

Seven online programs operate out of regular public schools while three operate at facilities within central offices. Three online programs operate as schools (with a school number) within local jurisdictions. Fifteen programs voluntarily restrict their operations to serving the needs of students within their local jurisdiction or regional area, while six online schools operate with a provincial mandate to serve students across Alberta. Three online schools are attempting to recruit students from outside Alberta with the goal of building an international student body.

Instructional practices also varied among online schools. Some teachers posted course content and assignments to web sites or course sites. Students were instructed to work independently through the course contacting teachers when they encountered problems. In other cases, teachers posted course content at the beginning of the term and sent weekly by e-mail for students to complete and return in a set time period. Some teachers posted assignments and communicated with students through e-mail, telephone and synchronous chats on a weekly basis while other teachers rarely initiated contact with students.

The size of online programs is another area of great diversity. Some programs operate with as few as 15 students, while other have more than 1,000 students. Still other online programs are operated as private fee-paying schools which offer specialized religious programs arranged for children of missionaries. Also, at least one large online program operates as a program affiliated with a home schooling centre within a school jurisdiction.

Staffing levels vary within the online programs. As could be expected, larger programs have larger full-time-equivalent (FTE) staffing levels. Yet, while the number of teaching staff is linked to the number of students within a program, pupil teacher ratios (PTR) appear to vary considerably among online programs. The differences in PTR and the rationale for such differences have not been researched nor have the discrepancies in PTR been examined to analyze their effects upon how teachers work in online environments. Factors such as instructional patterns, organizational philosophies, and fiscal arrangements may also affect staffing ratios and consequently teachers' working environments.

Staffing arrangements within current online programs are also diverse; some teachers work full-time online while others share teaching responsibilities between online programs and site-based learning environments. One question arising from divergent staffing arrangements is how do they affect teachers in carrying out their teaching responsibilities? Do teachers who hold responsibilities for both online and site-based learning repurpose materials developed for one program in another?

Because online education teachers can fulfill their professional responsibilities through their access to a network connection they no longer need to travel to a specific physical location to teach. Potentially, online education can be conducted from any location which has the necessary equipment and network connections. This break with attendance at a specific school site by teachers is in many ways the equivalent of schooling at home, where teachers work from their principal residences. Working from home is quite new to education. The effects upon teachers and their professional practice is unclear. The ability to teach at any time--and potentially from any place--raises interesting questions about roles, responsibilities, and compensation for online teachers. How teachers view these questions was explored in this research project.

The diversity within online education in Alberta also extends to the students currently enrolled in online programs. A preliminary analysis of online program web pages, program brochures, and personal communications with online administrators revealed that a number of distinct student groups have chosen to receive their education at a distance. Some students are geographically isolated and either cannot attend a site-based learning environment or they attend a small school which cannot offer a full range of courses. Some online administrators have suggested that students from home schooling backgrounds, students from families with strong religious beliefs, and students who may no longer be welcome in traditional schools may be important and increasing constituencies for online programs. While Synder (1997) and Gamble (1997) have documented information on parental preferences for alternative education, information on both students' motivations for enrolling in online programs and the characteristics of online students is lacking. Also, any notions about the possible relationship between student background characteristics and success in online learning are also currently undocumented.

Another development that may affect online education in Alberta is the desire by some online program administrators to form a provincial consortium of online programs. While a consortium could potentially result in individual organizations accomplishing more together then individually, the entrepreneurial climate in which current programs operate presents formidable obstacles. A consortium requires some surrender of individual autonomy to the collective (Haughey & Fenwick, 1996). The impact of a consortium on online programs remains undocumented but it may provide yield important information about online practices which in turn could influence the growth of online education in Alberta. Haughey and Muirhead

(1999) recommended that a consortium of online schools and school jurisdictions could provide a means by which the challenges associated with online education could be cooperatively addressed. At the time of this study, (January-June 1999) the Alberta Online Consortium had not been officially formed. Subsequent to this study, the Alberta Online Consortium was formed in September 1999.

Information and Communications Technology

Online education must be situated within the continuing application of technology to teaching in contemporary education. According to Basalla (1998), the evolution of technology in western society has been a result of the "pursuit of need or invention" (p. 26). Within the public education sector, the pursuit of "need" has been distinguished by desires to improve student learning, and to increase access to education. These desires have been consistent with a desire for additional productivity from teachers (Berge, 1998).

One longstanding desire of teachers has been to find a solution to the problem of how best to address the unique needs of students. While teachers have attempted a number of strategies which individualized instruction, these have at times resulted in significantly increased workloads and stress, and in some cases teacher burnout (Chorney, 1997). The problems of teacher stress and burnout are multifaceted. Computer-mediated communication (CMC) has been identified as one solution to providing more individualized instruction to students (McGreal, 1998; Mehlinger, 1995; Norris & Dolence, 1996; Oblinger & Maruyama, 1996). However, the impact of CMC upon teacher stress does not appear to have been researched. Berge (1998) viewed the potential to individualize instruction as the chief incentive for adopting CMC and suggested that teachers who use CMC have the ability to "improve the quality of education in ways never before possible" (p. 19). Furthermore, he contended that CMC can move current teacher-centered environments towards learner-centered environments. Adoption of CMC can allow teachers the flexibility to address such topics as critical awareness of issues, student motivation, collaborative learning, active learning, interdisciplinary approaches to knowledge, and multiple learning styles in ways not possible in site-based learning environments.

Internet technology can be seen as providing an extension to CMC. Moore and Kearsley (1996) viewed the use of Internet technology for education purposes in evolutionary terms stating that distance education is characterized by networks and multimedia unlike the previous generations of distance education which relied upon the mail system (correspondence education) and upon broadcast and telecommunications technologies (radio, television, audio, and video). They saw online distance education as evolutionary in following earlier patterns of technology adoption by distance educators to improve distance learning opportunities. While computer technology has been applied to many tasks within schools, it is the ability to mediate communication between students and teachers which has been pivotal to the growth of online education. Without the growth of the Internet and widespread access by students across Alberta, online education could not exist in its current form.

In *Enhancing Alberta's Adult Learning System Through Technology* (Alberta Advanced Education and Career Development, 1996) and *Vision for Change: A concept paper for the Development of a Virtual Learning System* (Alberta Advanced Education and Career Development, 1995), AAECD concurred that education at both the K-12 and postsecondary levels could benefit from the use of new technologies for instruction and learning. These reports acknowledged, in part, that the use of technology is critical to many careers, that technologies facilitate more efficient and effective learning, and that technologies are tools for re-engineering the educational system. Not all commentators share that view of the benefits of using technology in education. For example, after examining the history of technology adoption by teachers and the public education sector in the US, Cuban (1986) suggested that the major impediment to successful technology adoption is the misfit between entrenched teaching practices and the demands of technology.

Cuban recommended that successful adoption of new technologies by teachers requires changing "what teachers believe" (p. 109). His prognosis concerning the difficulty of this task was not overly optimistic. In his opinion, "getting professionals to unlearn in order to learn, while certainly not impossible, is closer in magnitude of difficulty to performing a double bypass heart operation than to hammering a nail" (p.109). The difficulty of altering existing beliefs and work patterns was echoed by Drucker (1994) who suggested that unlearning previous practices was far more difficult than learning new skills in the face of change.

Yet, the application of technology within online education is markedly different than past attempts to integrate technology into site-based learning settings. Online education is partly defined by the capabilities of the technology and hence technology as such is indispensable and integral within online education.

The type of technology employed by online schools in Alberta varied substantially (Haughey & Muirhead, 1999). All schools used e-mail for communication between students and teachers. In the 1998-1999 school year three out of 20 schools used Lotus Notes and six used First Class. Three schools used web pages to post lessons to the Internet while seven used combinations of web pages and Adobe Acrobat files to send assignments to children. One school had experimented with software such as WebCT and Learnlinc. All schools used fax machines to exchange assignments with some students and the telephone to provide technological and instructional support to students.

Recent research conducted by Wideman and Owston (1999) at Atkinson College, York University, suggests that where interactions between students and faculty are frequent, where procedural and technical support is provided, where online discussion groups are employed and where course design is sensitive to the challenges of online education, students "did as well as students taking the same set of courses in class and better than those enrolled in the traditional correspondence versions of the same courses"

(p. 23). While the authors did not reach firm conclusions, they suggested that internet-based education was a pedagogically sound approach for students both on and off campus.

The use of technology in online education is not "an add on" but it helps to create the primary educational environment within which students and teachers interact and learning is facilitated. Questions remain concerning the extent to which educators, parents, and students view technology as increasing the effectiveness of teaching and learning.

Content Development and Instructional Design

Online administrators, teachers, and Alberta Education officials, have expressed concerns about the development of quality course content for online programs (Haughey & Muirhead, 1999). The term course content as the preferred term in the K-12 sector reflects its use in curricular documents by Alberta Education. Content is viewed at the K-12 level as the instructional materials used to support student learning. Curriculum refers to the learning outcomes and objectives contained in the Alberta Program of Studies. Therefore, course content to meet the learning outcomes and objectives is the responsibility of K-12 teachers to research, develop, and revise. This interpretation of curriculum by Alberta Education is not universally shared. According to Alkin (1991),

> Curriculum is a complex term that has no agreed upon definition. Some educators define it as comprising all those activities that teachers plan in school while others define curriculum to include all experiences that a learner has in a school and all the courses, guidance, specific instruction, physical activities, opportunities for experiences, testing, and evaluation, and modes of interactions. (p. 151)

In this study, the term course content refers to course materials and instructional strategies used by teachers to plan for and carry out when teaching. The more important question of understanding how teachers make decisions about course content in online teaching requires examination. Therefore, a review of some of the issues and practices associated with content development and current models of content development by online teachers in Alberta was included to provide a background to this research project. Also, a review of issues associated with instructional design practices by online teachers was examined previously by Haughey and Muirhead (1999) to provide a context to instructional design in online K-12 education in Alberta.

The Content Development Process

Smylie (1994) described the development of course content as a decision-making process where issues including instructional emphasis, time allocations, instructional tasks, and learning activities are largely determined by teachers' beliefs. Similarly, DeSieno (1995) stated that the development of online course content is complex and infused with beliefs about teaching strategies and styles, personal beliefs about teaching, philosophies concerning learning styles, and expectations borrowed from site-based learning environments. While both DeSineo and Smylie concluded that teachers' beliefs determine educational content, other factors also influence the content development process. Having sufficient fiscal resources often determines how much time there is to develop content and the type of online content (e.g., digitized video, audio, animations) that can be undertaken. Other factors such as teacher expertise, organizational support, infrastructure constraints, and pedagogical issues are also known to affect the development of content materials (Bates, 1995).

Personal communications with Alberta Education officials and online school administrators as well as recent research by Haughey and Muirhead (1999) identified some of the issues involved in development of multimedia content. In traditional schools, teachers do not always share resources. This was also the case in online course development. In some situations, teachers worked in relative isolation from their peers. Often traditional print resources (e.g., textbooks and curriculum guides) were the primary sources consulted in the development of online course content. Teachers sometimes worked from home with limited opportunities for collegial interaction or the sharing of resources. Others worked in small online programs where they had sole responsibility for content development in particular curricular areas, again in relative isolation.

In other organizational situations, teachers worked in a group setting where content was developed with system supports. In the LearnNet Program in Edmonton, teachers worked cooperatively to develop course content. In some online school programs, teachers drew upon the resources of Internet and network specialists to support the development of online content.

In other situations teachers focused on instructional strategies rather than content development. They used and adapted materials developed to facilitate independent learning. Online programs such as Medicine Hat's Independent Learning Program or Peace Wapiti Virtual Education (PAVE) relied upon materials purchased from the LearnNet program of the Edmonton Public School District. Anecdotal reports from teachers indicated that where online programs have been purchased, teachers spent large amounts of time personalizing course content and adapting instruction to match the needs of their students. The content development process found in many online programs was in sharp contrast to the content development model followed by Alberta Education for its distance education print materials. The development process for online materials by Alberta Education has acknowledged the desire by teachers to personalize online course content. Consequently, rather than developing complete online courses the Learning Technologies Branch continues to explore the development of knowledge objects (e.g., multimedia segments and java applets) which online educators can use and personalize in online courses.

Within Alberta Education a team approach to content development has been employed involving subject specialists, media developers, editors, graphic artists, instructors and, in many cases, departmental officials from both curriculum and regional services. The team approach was pioneered by the Open University in England which established this model for the development of distance education course materials. Individuals brought specific expertise to the instructional design process (Moore & Kearsley, 1996). This model recognized that no one individual could reasonably possess all the desirable skills to develop quality course materials. While successful at the Open University and other unimode distance education institutions, its applicability to other institutions has been limited by a lack of financial resources. The team approach to the development of distance education material is the most common model adopted in Canadian universities and provincial education departments.

One weakness of the online content development models then used by Alberta's online schools was the exclusion of instructional designers. Haughey (1989) observed that "the most important contribution of the educational developer is at the beginning of the course development process. During the dialogue with the content writer the developer must ensure that all the pedagogical issues are raised and addressed" (p. 52). Certainly, one of the challenges faced by online educators in developing instructional materials is the need to critically examine the pedagogical issues related to content development, teaching, and learning. Little information exists on how K-12 online materials are developed and how they are piloted, revised, and improved over time.

The development of course content is closely tied to decisions about instructional practices. Decisions concerning how instruction is planned and carried out are often based on the nature and type of content to be used in an online course. On the other hand, content decisions are often based on considerations about instructional strategies including learner characteristics, instructional objectives, task analysis, content sequencing, delivery, evaluation, and revision. From the perspective of experienced teachers the relationship between instruction and content is complex and dynamic (Palloff and Pratt, 1999).

Planning for Instruction

Regardless of instructional environment, teachers plan for instruction. Such planning often involves a number of decisions to be made by teachers concerning content, assessment, and learning activities. Brophy (1988) described instruction as preplanned behaviors that combine considerations about learning principles, child development, instructional strategies, and student management. Clark and Starr (1991) saw teaching as encompassing six steps from reviewing pertinent previous learning, teacher presentation of new material, guided practice, feedback and correction, independent practice, and weekly and monthly review. Other approaches to instruction place less emphasis upon direct instruction and more upon self-directed learning, discovery learning, and cooperative learning. These three learning approaches are outlined below.

The basic requirements of self-directed learning include teachers making planning decisions about how to help students get ready for managing their own learning, showing students how to apply appropriate study skills, assisting students to learn from their research, providing instruction for independence by assisting students to meet with others to share what they are studying, and guiding students to apply their learning to other learning tasks (Borich, 1996).

Teachers adopting a discovery learning approach seek to help students learn to ask questions, to seek answers or solutions and to construct their own theories/ideas about problems. The central role of teachers is to facilitate dialogue suggest strategies and create conditions in which open and honest exchanges of ideas can occur (Arends, 1991).

Cooperative learning involves teachers structuring a lesson so that students work and learn together to accomplish a goal. Students learn together through discussion, share responsibility for learning, and are actively engaged in teaching each other.

The traditional teaching-planning model employs a combination of objectives, content, instruction, and assessment to provide a carefully chosen sequence of lessons which includes not only teaching methods but learning activities. Each sequence is part of a unit and the combination of units ensures that students have been exposed to all concepts and processes required for successful course completion.

Alternative teaching strategies from student-directed to problem-based, discovery-based and cooperative learning approaches generally fit within this broad frame. Teachers vary in the ways they approach planning: some begin with resources such as a well-organized text while others plan around a sequence of activities designed to engage and motivate the learners. Contemporary planning models based on premises about knowledge as constructed in learners' minds rather than transmitted from teacher to learner, call for a radical change to planning. Active engagement in making things often through group work encourages situated learning. However, the focus for planning a "course" of intellectual development and on providing guidance and monitoring understanding remains at the core of teacher planning.

That planning now requires the design of cross-discipline, project-based learning that is sequenced so as to provide for comprehensive education and which is rich enough in resources to encourage the development of knowledge building communities (Beretier & Scardamalia, 1993) or communities of learners (Lave & Wenger, 1991). Such communities involving teams of learners who learn to work together and who share their knowledge (Pea, 1994) is one of the foundations of this approach.

This orientation towards planning for teaching and learning advocates that knowledge is constructed, knowledge results from activity, knowledge is in the mind of the learner, and that meaning results from social discourse where knowledge is shared with others. Jonassen, Peck, and Wilson (1999) suggested that constructivism results in planning for instruction that helps learners to "construct their own meaning from the experiences they have by providing those experiences and guiding the meaning-making process" (p. 3). They also suggested that technology can enhance constructivist teaching by creating knowledge-building communities through the use of information and communication technologies, visual displays of information involving the multimedia and hypermedia capabilities of computer technologies, and the Internet where students can search and explore information relevant to a more student-centered problem-solving environment. Yet, the authors pointed out that the move from a traditional to constructivist teaching methods involves both a change in assumptions about what learning is and how learning is assessed. The "viability" of constructivist teaching methods for online education is further addressed in Chapter 8.

Each of the proceeding approaches to planning requires teachers to make long-term and short-term decisions about their students, and about what skills, knowledge, and attitudes students should acquire. These decisions are related to students' prior knowledge, their readiness to proceed with new curricular material, activities which best address individual and classroom needs, appropriate course content, and how best to assess student learning (Joyce, Weil & Showers, 1992). Goodlad (1991) described the complexity faced by teachers when making decisions about planning for teaching in the following terms: "A profession of teaching in schools must arise out of the special layered context of the work, the complexity of the context, and the special knowledge skills, and personal characteristics required for the burden of judgment entailed"
(p. 6).

Within online teaching environments, decisions about teaching are further complicated by the necessity to attend to the technology which underpins the instructional environment. Driscoll (1998) suggested that many of the considerations which online teachers must address are similar to those faced by classroom teachers. She recommended that online teachers must assess learner needs, select the most appropriate method for web-based instruction, and design lessons based upon interactions (e-mail, synchronous or asynchronous chat, and threaded discussions). The next step, according to Driscoll, involves teachers developing a blueprint or course plan describing lessons, units, modules, and plans for interactions. Developments of web-based materials follow with teachers identifying the type of digital resources which best address both the learners' needs and the goals for the course such as multimedia segments, text, graphics, and sound files. Interactions between students, teachers, and material are then incorporated into the course blueprint.

Instructional Design

The many considerations associated with planning for learning have been grouped under models of instructional design. Kemp, Morris, and Ross (1998) described instructional design as being concerned with the systematic planning processes and corresponding decisions which form the basis of an integrated plan for learning. In traditional instructional design, the planning process has five steps: needs analysis, writing of objectives and reviewing of existing materials, production, implementation and pilot testing, and evaluation are commonly used in the literature. The final evaluative step involves ensuring that any difficulties associated with the course can be addressed and improvements made before the course is offered again. This planning process has been used frequently in the development of distance education correspondence materials by Alberta Education. Far from being a simple process, instructional design requires an examination of each component within the teaching-learning milieu.

Ahern (1998) echoed the views of and Kemp et al. (1998) and supported the essential contribution that instructional designers can make to online education. In Ahern's view, instructional design requires two pieces of essential knowledge--knowledge of students including group dynamics and culture, and knowledge of learning objectives and outcomes. Knowledge of students is important in assisting the instructor and/or content developer to adapt instructional processes to meet the needs of a student group.

Further, Kelly (1990) suggested that instructional design is made more complex by the lack of understanding by K-12 teachers of the issues associated with instructional design. She pointed out that when K-12 teachers are asked to describe a course, those accustomed to face-to-face teaching will frequently produce a table of contents and possibly some information about credit value and assessment weighting. However, when planning a distance education course, a table of contents has limited value. It will indicate what areas of knowledge are to be covered though not necessarily either how topics are related to each other or where emphasis is to be placed (p. 83).

Kelly's contention that teachers do not possess all the necessary skills to switch from face-to-face teaching to online education appears plausible at first glance. Media considerations, assessment procedures and expectations, interaction between students and instructors, student groupings, relationship building, and learning styles are all issues which are important in site-based learning and appear to assume even greater importance in online teaching and learning. Additionally, the pace of innovation within the computer industry continues to demand constant upgrading of technological skills necessary in a digital environment. How well online teachers are prepared to tackle the complexities of assuming concurrent roles of content developer, multimedia publisher, and instructor is unknown. Kelly pointed out that the scale of complexity in distance education and online education has acted as a motivator for developing team approaches to content/course development. Instructional design as described by Eastmond (1998), Kelly (1998), and Kemp et al. (1998), relies upon a set of assumptions concerning how instructional design is best practiced. According to Willis (1995) and Ertmer and Newby (1993), assumptions such as instructional design is sequential and linear, planning is top-down, experts predefine facts, and knowledge and assessment are teacher-centered assume importance in objective-rational instructional design models. In addition, teaching and learning are viewed as instructor-centered rather than student-centered.

However, neither all instructional design models nor all K-12 online teachers share these assumptions. A number of instructional design models challenge the assumptions of the objective-rationalist model. The cognitive and the constructivist models present different perspectives concerning the practice of instructional design.

In examining the role of instructional design within the K-12 sector, Eastmond (1995,1998) stated that little attention has been paid to instructional design for computer-mediated communication (CMC). This lack of attention has been due, in part, to the recent use of CMC in K-12 education coupled with a lack of familiarity with the role of the instructional designer. Eastmond (1998) suggested that the chief value of instructional design in the K-12 sector is the opportunity for educators to ask questions and make more informed decisions about planning and designing online education. The model described by Eastmond (Figure 2.1) retains components of the traditional five-step instructional design process but consolidates them into a three-step process: analysis and planning, design and development, and implementation and evaluation.

Ertmer and Newby (1993) have stated that instructional design from a cognitive orientation is concerned with planning learning opportunities in which students can process information in meaningful ways. The application of this learning theory to instructional design emphasizes problem solving, linking new information to previously learned tasks, and organizing information in ways that students can optimally assimilate, retrieve, and apply. Strategies such as the use of advance organizers, analogies, and matrices of prerequisite knowledge are all emphasized in this approach. Ertmer and Newby suggested that "the real focus of the cognitive approach is on changing the learner by encouraging him/her to use appropriate learning strategies" (p. 59). The planning process is linear but the focus is upon how instruction can facilitate student thinking. This view of learners as active agents in their learning is shared by the proponents of the constructivist-interpretivist model.

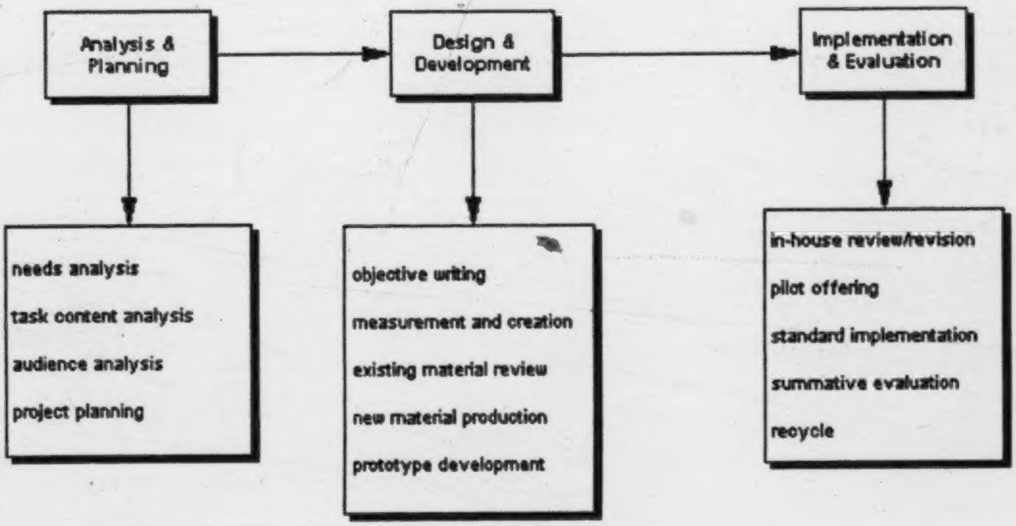
Analysis & Planning
Design & Development
Implementation & Evaluation
needs analysis
task content analysis
audience analysis
project planning
objective writing
measurement and creation
existing material review
new material production
prototype development
in-house review/revision
pilot offering
standard implementation
summative evaluation
recycle

Figure 2.1. Instructional design sequence, Eastmond (1998).

Honebein (1996) and Willis (1996) proposed that constructivist-interpretivist instructional design models are based upon different assumptions about learning and how learning occurs, and hence place greater importance on the shared construction of knowledge. Willis (1995) contrasted the assumptions of an objective-rational model of instructional design (similar to Eastmond and Kelly's views concerning instructional design) with the assumptions of a constructivist-interpretivist model, which portrays instructional design as recursive or interative. Willis believed that designers should continually question these six teaching and learning assumptions and the processes by which learning products are developed:

1. Planning is not linear but is a constant design feature which is continuously practiced throughout the development and instructional stages.

2. Objectives emerge from the design efforts and therefore do not guide development.

3. General instructional design experts do not exist. Instructional design is best carried out by instructors.

4. Instruction should emphasize learning in meaningful contents to avoid "inert" knowledge associated with direct instruction.

5. Rather than relying upon summative evaluation, formative evaluations yield information which can be used to improve the product.

6. In a constructivist-interpretivist model subjective data may be more valuable than data obtained from a 10-item Likert-scale.

In addition, Jonassen (1998), who supported constructivist-interpretivist models, noted that the constructivist orientation assumes that knowledge is constructed by the learner through social interaction and is based upon learners' interpretations of the world around them rather than knowledge as received truth. This idea has very specific applications to online education.

A review of the role of instructional design in online K-12 education revealed a number of models which educators can examine in the process of planning course content and instructional practices. Many practices are already being used by educators in planning for online education. Teaching practices occur in a larger content of accountability from reporting to parents to public examinations plus teachers own expertise and richness of their own prior teaching experiences in helping students to learn. How teachers currently teach online has not been documented. For example, what teachers do when planning for their courses is unclear and how instruction is organized and what relationships exist between content instruction and models of instructional design remain to be examined.

Summary

This literature review has revealed a number of themes which inform the field of online education but also raise important questions about current practices within the area. During the past 75 years, distance education has been acknowledged as a vital component of the educational landscape within Alberta. Beginning with the provision of correspondence lessons to rural students in 1923, the development of alternative forms of education has continued to expand in the province. The organization of the Alberta Correspondence School; the use of radio, television and audio conferencing; and the use of facsimile technology in the late 1980s have all been attempts to apply technology to student learning. Programs in the 1980s such as Distance Learning in Small Schools and the emergence of regional consortia in the 1990s (e.g., Distance Learning Options South and Big Sky) were attempts to expand distance learning options to students. These initiatives preceded the advent of online education but have provided an essential foundation for the emergence of online distributed learning throughout Alberta.

Another theme emerging from the literature has been the continuing desire of some parents to educate their children at home. Whether due to dissatisfaction with the public school system or a belief that education is primarily a family responsibility, online education has become a valuable tool in strengthening parental choice concerning how children can be educated.

Also the growth and accessibility of the Internet has provided an infrastructure for online education. Online education is dependent upon network technologies and the World Wide Web. These new technologies have provided the infrastructure and environment through which online education has been able to develop. The nature of the Internet with its ability to become a synchronous/asynchronous communication tool, a publishing tool, a library storehouse of educational content, and in essence an instructional environment transcends past educational technologies in scope and complexity.

While the separation of student from educator is not unique to online education, the potential to restructure and enhance learning is different. Providing multiple learning paths through course content or planning for different types of assessments and student interaction are promising in an online environment. However, issues of how teachers plan for, design, develop, implement, and evaluate online teaching and learning are under-researched. The focus of this study was to obtain information about issues associated with the development of online education and to elaborate upon matters raised within the literature that arise from the K-12 sector in Alberta.

Chapter 3

Research Design and Methods

Introduction

This chapter consists of an overview of the research design; a discussion of the issues associated with the study's trustworthiness; lists of assumptions, delimitations, and limitations; and a description of relevant ethical considerations.

Research Design

All methods of gathering data reflect beliefs held by researchers about the "reality" of the situation under examination and consequently these beliefs influence the interpretation and construction of meaning from data collected. Researchers must begin with an examination of their beliefs. Also, research methods chosen depend upon the researcher comprehending the various processes involved in research and the environment in which the proposed research will be conducted. Therefore, researchers must examine not only their own personal beliefs about how they construct their personal worlds but also how they come to understand the worlds of their research.

The following beliefs underpin the research design and methods used in this qualitative study:

1. Qualitative or naturalistic inquiry involves attempting to understand individuals and events in their everyday lives (Borg et al., 1993; McMillan & Schumacher, 1989). Glesne and Peshkin (1992) viewed qualitative research as a careful and diligent effort to "make sense of personal stories" (p. 1).

2. Teachers will understand and describe online education in ways that are similar but also peculiar to their own experiences and beliefs about teaching online. As Guba (1981) and Clandinin (1990) indicated, qualitative research encompasses multiple realities, which interact to form personal

practical knowledge. Hence, it is important to understand how teachers' beliefs affect professional practices in online education.

3. Data are infused with the lived experiences of participants. For that reason, it is important to understand the values and beliefs that underpin teachers' understandings of online education.

4. Interactions between participants and the researcher influence both the understanding that participants have of online education and also the researcher's understandings.

5. Research is best conducted in natural settings where the researcher can attend to nuances, interdependencies, and complexities of context.

6. In this study the researcher uses the data to develop a holistic sense of the research topic and to provide an interpretative account from his perspective that accounts for the views of his participants.

This holistic approach to research is particularly important when exploring unresearched or under reported areas. The choice of a qualitative research method does not negate the need for baseline data to help direct an investigation. However, little baseline data existed to inform a study on online education.

Study Design

Data were generated using ethnographic methods and features of narrative inquiry (Clandinin & Connelly, 1990; Denzin, 1997). Narrative inquiry is both phenomenon and method. It examines teachers' experiences and their practices through the stories they tell. Clandinin and Connelly stated that "the educational importance of this line of work is that it brings theoretical ideas about human life as lived to bear on educational experiences as lived" (p. 3). The use of story telling concerns "making meaning from personal experience" (p.4). Story telling also involves giving "voice" to teachers' perceptions, experiences, and insights into the act of teaching (Polkinghorne 1995). The importance of narrative in the study of teaching is supported by Cortazzi (1993), who has suggested that "to improve educational systems, curriculum reforms and classroom practice... we need to know more about teachers' perspectives" (p.5). Giving voice and recognition to the lived experiences of teachers is of particular importance when new practices are being developed and where new teaching methods and practices such as online education are being advanced and refined.

This was not an ethnographic study but used ethnographic research methods to examine human action in natural rather than in experimental conditions. Within education, ethnography attempts to preserve the "uniqueness" of the case to accurately represent the particular situation. Giacomi, Mosher, and Swenton-Wall (1993) have stated that "the ethnographic approach with its emphasis on 'natives' point of view,' holism, and natural settings, provides a unique perspective to bring to bear on understanding users' work activities...." (p. 123). Observing, conversing with teachers as they go about their work, spending time discussing observations, and learning in situ all contribute to careful descriptions of the reality under study. In this regard, Scott (1996) stated "that descriptions of social reality are incomplete if they do not take account of the views and perceptions of social actors" (p. 144).

Kvale (1996) advised that if researchers want to understand the "life worlds" of individuals then they should ask questions. Moreover, once having asked the question, they should listen to the complete answer giving individuals the opportunity to construct their own meanings through the use of words to portray this reality. Fontana and Frey (1994) suggested that interviewing is a "much harder task than it seems at first" (p. 361). They advised that interviewers should not focus exclusively on the words used by the interviewees, but also attend to their tone of voice and feelings. By attending to the "situatedness" and substance which respondents disclose, researchers can better understand the phenomena under investigation.

Carney (1990) suggested that successful use of semi-structured interviews in research studies required the interviewer to become the instrument. The choice of semi-structured interviews and the use of the interviewer as the research instrument provides for "maximum flexibility, adaptability, insightfulness sensitivity, and perceptibility." Carney stated that "no formal instrument can match a human being in these regards" (p. 5). However, he cautioned that the use of a human instrument results in difficulties concerning subjectivity and selectivity.

The decision to use semi-structured interviews in this research project was also influenced by awareness that information useful for researchers is not always organized by the interviewee (Miles & Huberman, 1994). Semi-structured interviews provide maximum opportunities for interviewer and interviewee to explore meaningful topics of interest to both, without the restrictions of preset questions associated with structured interviews.

Teachers were approached by e-mail to participate in this study. Follow-up telephone contact was made with all teachers to explain the goals of the study and to set up appointments to visit them in their work places to observe them teaching online. During site visits, teachers were asked to explain how they had developed course materials, and to review some of the online courses and online resources which they had developed.

The semi-structured interviews followed a pattern in which opening questions were posed from four areas: personal background, interaction, assessment strategies, and content development Appendix a). Questions were developed based upon a review of the professional literature, the prior knowledge and experience of the interviewer, and discussions held with other online educators from across Alberta in my position as Virtual School Consultant for Alberta Education. Initial interview questions were used to prompt teachers to describe their professional practices and to initiate discussion rather than to shape specific responses to prior questions. Therefore, semi-structured interviews were used in this study to elicit both descriptive data and insights into online education.

After reviewing transcripts and field notes, some teachers were subsequently contacted to clarify points raised in the interviews. In many cases, the conversation about online teaching practices continued as my professional role brought me into regular contact with many of the interviewed teachers at conferences, provincial inservice sessions, and symposia.

Selection Criteria

In 1998-1999, 20 online schools or online programs operated in Alberta. A great deal of diversity existed among programs characterized by variations in program size, geographical location, clientele, and instructional models. The number and diversity of online programs in Alberta necessitated reducing the number of programs that could be reasonably examined in depth at one time. The decision to approach teachers from four online school sites was based upon their organizational patterns. Each online school operated as a separate organization from the parent school jurisdiction. Furthermore, four schools were chosen to reduce the financial resources involved in visiting more than four sites. Another important decision in choosing the four online schools in this study was their level of technical infrastructure and support. Each school used similar procedures and operated in similar technical environments for developing course content while employing teachers to both provide instruction and create course materials. The four online schools also employed teachers under similar contractual conditions rather than employing teachers outside the Alberta Teachers Association agreement.

The decision to select teachers working in online programs as research participants was important for the insights they could provide into how teaching, learning, and content development occur in online education. Teachers can provide valuable insights into their beliefs, which support notions about emerging instructional patterns in online education and possess the capacity to intuitively discern the hidden nature of online education.

Teachers from four locations were approached by e-mail to participate in this study. After preliminary interviews, 13 teachers were chosen to participate in this study. All teachers were assigned to online teaching positions and therefore had personal experience with online education. The selection of teachers was based upon length of online experience, orientation to online education, and comparable subject and teaching levels and location.

Informal discussions also occurred with online school administrators about general aspects of online programs.

The selection of teachers also ensured that teachers who taught from home were included in this study. Working from home presented an opportunity to examine the perceptions of teachers about both online education and the experience of teaching from home. During the data-gathering process, all of these teachers allowed me to visit their homes and shared insights about the experience of living, working, and teaching from home.

Each teacher participated in two interviews which were audio-taped, transcribed, and returned to participants for verification. Onsite visits were arranged to allow for interviews and observations to occur. Online course materials, web pages, assignments, sample units, student manuals, and other materials in development by teachers were examined. During site visits, teachers were encouraged to discuss the online materials they had developed with reference to their perceptions and practices around the development process.

Data gathering took the form of visiting all teachers in their workplaces. Site visits often began with a discussion of the nature of this research project. Teachers often asked about the goals of the study which led to an opportunity to discuss online education in Alberta, their perceptions of where it might be going, and their views about online education within their jurisdictions. While discussing the goals of this research project, I clarified that my role as a university researcher was distinct from my role as a provincial education official and this often provided me with an opportunity to share with teachers my professional background (see Appendix B) and to discuss their professional histories at the same time. The importance of separating my roles was important and in most cases led to discussions about the development of online education in Canada. This informal exchange was an important feature of establishing a rapport with teachers whom I had not met in my professional capacity. I was initially very concerned that potential participants might feel constrained to report information that put online learning in a less than positive light. Their willingness to report their own negative feelings helped me recognize that this was not an impediment to the study. Although I was confident that my position had provided me with a comprehensive understanding of online teaching, interviewed teachers felt comfortable in clarifying or correcting my assumptions. Teachers often challenged assumptions I held and felt it possible to report negative aspects of online teaching. However, I remained watchful throughout the data analysis process to ensure that their trust was never discounted.

Following this initial conversation a tour of a teacher's work location often took place. This often led to discussions about working in non-traditional locations such as from an office or from a home. In most cases, teachers then reviewed their online courses and often provided examples of their online communication and interactions with parents, students, and other colleagues. In all cases, site visits occurred during the teaching day resulting in teachers often answering e-mail, and telephone inquiries or interacting with colleagues where teachers worked in office settings. Throughout the interviews, field notes were generated to record impressions, points of interest, and observations which were explored in greater depth during audio-taped interviews. These interviews were two to three hours in length and often spanned more than two sessions in order to leave teachers with opportunities to return messages. In a few cases, we shared a meal (lunch) or took a coffee break together. Upon completion of site visits and interviews, I immediately audio-taped impressions about the site visit and recorded more lengthy field observations using a hand-held tape recorder. These impressions and observations were later transcribed and were added to the field notes written during my site visit.

Upon completion of the transcription of the interviews, copies of the transcripts were electronically forwarded to interviewees for review, and permission sought for the interview data to be used in reporting upon this research. Research participants were informed that they could edit transcripts for inaccuracies, misleading information, and errors, and that they could delete any portion of the transcribed interview. Consent was also obtained for inclusion of relevant personal information, for teachers identified by pseudonyms, in this thesis.

Data Analysis

The data analysis strategies of grounded theory were used throughout this part of the study. Grounded theory seeks to identify ways of constructing information that are used in practice and to use these as the basis for theory development. In this study while the methods were not followed, many of the techniques proved helpful and the study was undertaken within a general grounded theory orientation. Constant comparison, memoing, diagramming and visual mappings of linkages were used through data gathering and analysis to establish understandings.

Analysis of narrative accounts sought, in part, to illuminate how teachers understood the act of "teaching" online, what approaches they employed, and what instructional patterns they retained and used from traditional instructional environments. Data analysis is not an event that has clear beginnings and ends, but is iterative. Inquiry is an ongoing process of probing for meaning, conceptualizing-re-conceptualizing, testing for meaning, and seeking verification. During the data-gathering process of this study, memoing was used to provide a history or path by which themes could be identified and probed for further understanding. Throughout the data gathering process, additional confirmation of ideas arising from observations or interviews was sought from other online teachers. The exchange of and sharing of ideas occurred after interviews and continued after teachers reviewed their transcripts. This constant sharing of reflections upon the research gave greater explanatory power to the analysis. Finally, qualitative data analysis is best accomplished when the researcher holds conclusions "lightly" seeking meaning from the data collected. Glasser and Strauss (1967) stated that from the start of data collection,

> the qualitative analyst is beginning to decide what things mean--is noting regularities, patterns, explanations, possible configurations, causal flows and prepositions. The competent researcher holds these conclusions lightly, maintaining openness and skepticism, but the conclusions are still there, inchoate and vague at first, then increasingly explicit and grounded. (p. 11)

Interview data were first checked for accuracy by reviewing the interviews while listening to the original tape-recorded interviews. Transcripts were then re-read several times to provide a more overarching perspective of the ideas and observations provided by teachers concerning online education. Marshall and Rossman (1995) have described data analysis as "the process of bringing order to structure and meaning to the mass of collected data" (p. 111). Data analysis according to Patton (1987) is further complicated by the lack of "a precise point at which data collection ends and analysis begins" (p. 144). However, while there is "undoubtly no consensus" concerning the analysis of collected data, Cresswell (1998) suggests that there are common practices for "winnowing" the data collected in qualitative research. Analysis of the research data involved reviewing ideas, observations, and impressions arising from the collected data. Impressions from the transcripts were compared to field notes made during onsite observations.

Data analysis followed a sequence of steps which, rather than proceeding in a linear manner, often resulted in a complex process where one step led to the next while at the same time also led back to the proceeding step or steps. Rather than moving continually forward, the process often followed a path in which previous steps were repeated before moving forward with analysis. Cresswell (1998) defined this processes as a "data analysis spiral" (p. 143). Field notes and transcripts were analyzed for common explanations, patterns, categories, and agreements. Preliminary coding involved searching for both similarities and differences among the data. Patterns were sought and categories identified based on a matrix. Categories were further divided into subcategories based on a more refined analysis of the data. Categories were also sorted into patterns based upon the four semi-structured interview question categories. Hypothesis were formed and tested against the data collected. Categories and subcategories were also sorted against the major and specific research questions. Themes were identified based on the categories and their interconnectedness to research questions.

The use of qualitative data analysis software (Nudist 4.0) allowed specific and random searches for common words, phrases, or terms that assisted in connecting tentative themes to transcripts and field notes. Documents, web sites, and course content provided by online teachers were examined to provide further support to the commonalities, contrasts, and conceptual themes. Of further assistance in the analysis of the data was the opportunity to generate graphs of categories, subcategories, themes, and impressions within Nudist which allowed a visual representation upon which to test understandings with colleagues and peers. Visual mind maps and charting were used to check for connections and relationships among the observations of teachers. Throughout the data analysis and writing phases of this research, peer review of results was important. Notions about online education, hypotheses, observations, and preliminary findings were frequently tested against the opinions of others involved in the field and with many of the online teachers interviewed in this study. Living with the research data, reviewing hunches, and reflecting upon impressions of the data collected also contributed to an overall understanding of online education arising from the experiences of the 13 teachers in this study.

Trustworthiness

According to Guba (1981), concerns about trustworthiness contain four major aspects--credibility, transferability, dependability, and confirmability. Each aspect of naturalistic research confirms the rigor of the research and contributes to confidence that a research study has value. Glesne and Peshkin (1992) suggested several modes through which data can be validated and trustworthiness established:

1. Asking the respondent to review drafts from audio-taped interviews for accuracy and if necessary revision or inclusion of additional data.

2. Becoming aware of personal biases and practicing reflexivity through asking questions such as Have I formed or do I have special relationships which may influence or color the interpretation of the data obtained during the research act? Or have my observations or selection of participants been influenced by professional biases? Questions concerning personal propensities to particular orientations contribute to greater confidence by readers that this research will be credible. The ability of the researcher to be aware and displace bias also contributes to the trustworthiness of the findings of this study. Long term engagement with participants also contributed to greater confidence that first impressions were minimized.

3. Using a variety of methods to collect data through observation, memoing, examining documents, and interviews increases the confidence that readers have concerning trustworthiness of this study.

4. Finally, changing insights and "instrumentality" of the researcher during the research study can be addressed by establishing audit trails. Audit trails are conducted by competent external individuals familiar with qualitative research.

Both fellow doctoral students and members of my supervisory committee reviewed the procedures to be used and practices used in this study. The task of analysis was made less onerous by the use of computer-aided qualitative data analysis software (CAQDAS). One of the chief advantages of CAQDAS is the ease of conducting audit trails (Kelle, 1995). The linking of research data to field notes is greatly simplified with the use of the computer (Miles & Huberman, 1994). The automatic generation of visual representations of data analysis (e.g., index trees of categories, and sub-categories) allows for more accurate audits to be conducted by the researcher. A fellow doctoral student verified the audit of transcripts, as did the transcriber of the interviews. Lee and Fielding (1995) remarked that dependability of the data analysis can be enhanced through the simplified storing and linking of field notes, interview data, and potential ancillary data collected during a research study.

Assumptions

Through examining beliefs and values that are held by online educators, I assumed that an understanding of their reality can be shared. Specifically I was interested in gaining an understanding of how online education is practiced in Alberta. I was also interested in how teaching and learning occur in online programs. Teachers working in online education are best able to provide valuable insights in the challenges of online education. As Greenfield (1993) stated, "no one can experience another's experience, but we may come to understand it. People can speak" (p. 66). Therefore, a number of assumptions underpinned this study.

The first assumption was that interviewees would honestly report their beliefs and understandings about the questions being asked. Also, they would answer questions to the best of their abilities and would not feel embarrassed or threatened to say that they had concerns related to practices of online education. This assumption was buttressed by sound personal relationships with seven of the online teachers through my frequent visits to their schools, and my previous meetings with nine of the 13 teachers at the local teacher symposium. Moreover, my familiarity to all the interviewed through my position with Alberta Education as the provincial consultant for virtual schools provided teachers with confidence that I possessed a clear understanding of the difficulties as well as the possibilities of online education.

The second assumption was that reality is socially constructed and complex. It is best understood within the context of the research participants. Consequently, a qualitative research design using semi-structured interviews and onsite observation to gather data was employed. Online program teachers are uniquely qualified to provide insights into online education in Alberta.

A third assumption was that the researcher's personal beliefs and history could influence the qualitative research process. They form hidden structures that can, if unexamined and not made explicit, unduly influence and bias the research process. Consequently, I made explicit my beliefs and knowledge about online education prior to teachers' participation in this study. My experience in computer mediated communication and my interest in online education developed through my previous employment in another province where I was involved in technology studies and implementation at a jurisdictional level. Previous web site development, administration and online teaching experience at the university level also helped to shape my understanding of K-12 online education. Previous research (Haughey and Muirhead, 1999) has enabled me to meet many of the online educators at the administrative level. During doctoral studies I participated in a practicum with an online school which subsequently led to my full time employment with Alberta Learning and the Alberta Online Consortium.

I believe that online education is and will continue to be an important and enduring development of K-12 education. Online education is central to current educational reform efforts directed to enhancing student learning and achievement. Teachers' beliefs and perceptions about online education are key to creating future educational practices within online education.

Delimitations

This study was delimited to the information provided by 13 teachers in four locations in Alberta who were involved in designing and offering K-12 courses via the Internet in the 1998-1999 school year.

Limitations

Online education in the K-12 sector in Alberta has developed rapidly. The situation for online teachers has changed even since the data were collected in the spring of 1999. There are provincial enhancements in computer software provision, in student access to Internet Service providers (ISPs), and in the provision not only of support to teacher's professional development in the area but also in decisions to do collaborative content development that could be shared by teachers from participating jurisdictions.

Hence to reduce this limitation, a section on recent developments is provided at the end of each findings chapter.

Another limitation of the study is that nine of the 13 online participants were in their first year of teaching online. In part, this was an artifact of jurisdictional employment practices. Whether more experienced online teachers would have provided richer information about online education is moot. What is clear is that these stories help us understand the issues faced by experienced teachers when first planning for online education.

Ethical Considerations

Ethics concerns standards of human conduct. Ethical concerns in research involve concerns about participants' privacy, consent, respect and safety (Glesne & Peshkin, 1992; Rudestam & Newton, 1992). This study met the University of Alberta guidelines for research by ensuring that participation in this study was voluntary, that participants clearly knew that they could withdraw at any point in the study, and that participants had the right to privacy, confidentiality, and anonymity.

To ensure confidentiality, pseudonyms were used to represent the online schools/programs and the research participants in reporting the findings of this study.

Member checks were conducted to ensure that participants had final approval over the data collected, and that they had the opportunity to withdraw from this research project at any time.

Summary

This chapter presented the methods and procedures used in obtaining information related to the research questions. During the first six months of 1999, 13 teachers from four online schools throughout Alberta were interviewed. A qualitative research method was chosen to gain a better understanding of the lived experiences of online teachers and more specifically to give voice to the rich lives of teachers.

Open-ended and semi-structured interview questions were used to gather thick descriptions about the world of online education. In addition, observing teachers' practices, keeping of a journal, reviewing online courses with teachers, and thoroughly analyzing relevant school documents were also undertaken.

A careful description of the methods employed in the conduct of this research were presented along with the ethical considerations, trustworthiness, limitations, delimitations, and assumptions underpinning this study.

A description of analysis of data was outlined which drew upon aspects of ethnography, features of narrative inquiry and grounded theory orientation and sought to illuminate how teachers understood online education and what instructional practices they employed. The decision to use of qualitative data analysis software was also outlined.

Chapter 4

Online Schools and Teachers

Introduction

This chapter describes the school/work settings and the teachers who took part in the study. School/work settings are described to provide a better understanding of the similarities and differences between each of the four locations. Brief descriptions of the 13 online teachers are presented to anchor an understanding of their perceptions of online education.

The decision to examine the perceptions of online teachers in Alberta grew from the notion that the success of online education would be heavily dependent upon the efforts and skills of teachers the processes involved in content development, and other factors such as technology and organizational issues. During the first six months of 1999, 13 teachers from four online schools shared their perceptions about online education, its challenges, and their hopes for its future.

Each teacher contributed to my overall understanding of online education and the general diversity of practices to be found within the online community in Alberta. All teachers spoke passionately about the challenges which online education presented to their previous notions about professional practices. The introduction of teachers to a mediated educational setting cast many practices into doubt. From the development of materials for students to evaluation of student learning, teachers reported how they had had to reassess their beliefs about teaching and learning. While many issues were raised and a number of matters were explored with teachers, four topic areas emerged over the six months of data collection and concurrent analysis. These topic areas, which are dealt with in individual chapters, are teaching practices, interactions, the organizational challenges, and technology.

The interviews clearly showed that online education challenged established notions concerning interactions between students, teachers, and parents. Teachers spoke at length about the roles of parents, teachers, and students, and how these roles were considerably changed in online education.

Online School Settings

The introduction of online education in Alberta created a variety of online schools and teaching environments. Some online schools are in urban areas and some are in rural areas. Some schools require teachers to work from an office setting, while others work from home.

Teachers in this study taught for four online schools in different parts of Alberta. Within the four educational settings of this study, each online school program operated as a school and all teachers thought of their professional practices as being situated within a school. For this reason, all locations are referred to as "schools" in this thesis.

While many dissimilarities existed among the schools in which teachers worked, many similarities were also noted. All schools offered similar programs, employed similar technology, and relied upon online teachers to research and develop the online courses. They were all affiliated with school districts resulting generally in similar policies, funding, and infrastructures.

Ninebark Virtual School

Five teachers taught for Ninebark Virtual School (NVS). The school offered a comprehensive online program for students from grades six through twelve. Following a successful trial period using e-mail and the Internet to exchange assignments between teachers and students, the school decided to set up an online program to begin operating in September 1998. Although the online school was to be housed within the larger organization, it was to be operated as a separate program within the larger school.

During the spring of 1998, five teachers were hired. The direction envisioned by school authorities was that the first teachers would begin developing courses over the summer and would have made sufficient progress in developing courses for the school to begin operation in September. While ambitious, the course-development process was helped by the acquisition of digital files and courses developed by the distance-learning branch of the provincial government.

NVS began operation in September 1998 with approximately 200 full-time students. At the end of its first year of operation, enrollment had grown to 395 full-time and 220 part-time students.

Unlike some online school settings where teachers worked in a school setting or worked from home, NVS teachers worked in an open-plan office environment. Each teacher was assigned a cubicle equipped with a high-speed Internet connection, a bookshelf, a desk, and a phone. When visiting teachers in this school I was struck by how unlike a traditional school NVS appeared to be. In many ways, NVS resembled a typical open-plan office.

Mulberry Virtual School

Three teachers interviewed in this research project taught for Mulberry Virtual School (MVS). It was one of the oldest of the 20 current online schools operating in Alberta from January to June 1999. Affiliated with a school district in an urban setting, it had begun operation in the fall of 1996 with 200 students. Many of the original students were from the local area and from home-schooling families.

From the beginning, one of the operating philosophies of the school had been that both teachers and students would be encouraged to work from home. Embracing the notion of "anytime-anywhere-education," MVS extended this to the location from which teachers would work.

Another unique feature of MVS was its philosophy about the role of the family in online education. From its earliest days, MVS had adopted a family-centered philosophy emphasizing the central role that family played in the lives of children. Family was considered critical to online education both because of the school's Catholic affiliation and because of its reliance upon parents to support and become actively involved in a child's education. MVS online teachers often spoke about students as having two families--their own and the family of the school. The notion of the family permeated the online school and influenced many of the administrative decisions such as providing for the exchange of students' names among families from similar geographical locations so that parents could organize activity nights for students on a regional basis. Through sharing contact information about students, the school attempted to build an "online Christian community" where students could feel that they were part of the larger school community.

Unlike traditional education, which requires a physical infrastructure in which teacher and students meet physically and interact, online education occurs over a network where communication is mediated by the use of computer technology. For the most part, course materials are exchanged over the Internet and materials are stored on school servers. The absence of the requirement for a specific physical location from which to work has allowed teachers to work from any setting where access to the Internet is available. This new flexibility around location was one of the hallmarks of Mulberry Virtual School (MVS).

Elder Virtual School

Two participants taught for Elder Virtual School (EVS). It was located in one of Alberta's newest regional high schools. Unlike teachers from NVS who worked in an office environment or teachers from MVS who worked from home, teachers at EVS taught from school offices adjacent to a computer lab. This working environment allowed teachers to meet with online students in a lab setting. If required, online students could come to the high school for tutorial assistance. The computer lab was also used as one of a number of sites across the province for twice yearly face-to-face assessments (mid-term and final-term examinations). Moreover, the addition of a computer lab within the local high school allowed students from the high school to enroll concurrently in face-to-face and online courses. Resident students often worked from the lab setting to access their courses and study during non-scheduled time during the school day. During the 1999 spring term, approximately 350 local high school students had enrolled for one online course. The use of online courses to augment the courses offered by the high school illustrated how online courses were being used to augment student choice in traditional school settings.

Sumac Virtual School

Three teachers were employed by Sumac Virtual School (SVS). This school was in its first year of operation. The decision to open an online school had been driven by the need to provide greater choice to local parents for home-schooling their children. As in Elder Virtual School, SVS teachers worked in an open area adjacent to a large computer lab in the local regional high school. SVS had one full-time online teacher and six other teachers from the regular high school who had been assigned to teach online part-time. This staffing arrangement supported the superintendent's belief that all teachers possessed the skills and attributes to teach online. The superintendent also believed that teachers who held either online or traditional teaching responsibilities could draw upon their experiences from one teaching environment to develop and enhance materials for the other teaching environment. The notion of the online program as "just another educational delivery option" within the school presented a singular view of where online education belonged in a school district.

The Online Teachers

Thirteen online teachers were interviewed over six months, January to June 1999. Teachers were chosen based on length of online experience, and comparable subject and teaching levels. In addition, factors such as their experience of teaching online, their courses, recommendations from district superintendents or administrators, and my familiarity with their work through my professional roles with Alberta Learning and the Alberta Online Consortium played a role in their selection. All teachers brought personal perspectives to online education and willingly shared their thoughts and observations about their life online.

The professional experiences of the teachers interviewed were diverse, ranging from those beginning their careers (two) to those with some 15 or more years of classroom experience (three). Two teachers brought extensive experience from industrial settings, while two possessed experience from teaching in both the public and postsecondary sectors. Four teachers possessed specialized skills relevant to online teaching such as computer programming skills that allowed them to develop software solutions to pedagogical issues, whereas three teachers were novice computer users.

Table 2 lists the pseudonyms used in this study including teacher names, the schools in which they taught, the subjects taught and grade levels, and their length of classroom and online teaching experience.

A common characteristic among all teachers in this study was their high level of personal commitment to online education. The conventional 8:30am to 3:30pm teaching day was usually extended. Teachers spoke of working nights, weekends, and often during summer holidays to plan for and develop online courses. They also spoke of the need to work evenings if they were to maintain a reasonable turnaround time for returning assignments to students. None of the teachers regretted the decision to teach in an online environment. However, each teacher was acutely aware of the personal sacrifice required in pioneering a new form of education.

Ninebark Virtual School Teachers

Joan was in her first year of online teaching. Her previous teaching background included fashion design, science, and information processing at the junior high school level. Joan had expressed a desire to work in an area which combined her interest in computers. After joining NVS Joan spent her first summer on staff developing online courses in junior high science, social studies, and health. She shared with her husband an interest in computer programming. During her first year, Joan and her husband had jointly formed a computer consulting company that had developed new online testing software. Joan often remarked how important it was to have an understanding

Table 2

Schools, Subjects, and Grade Levels Taught, and Lengths of Teaching Experience of Online Teachers

Online teacher	Online schools	Subjects taught and grade levels	Length of online teaching experience	Length of classroom teaching experience
Joan	Ninebark Virtual School	Junior High Science, Social Studies, and Health	First Year	6 years
Denise	Ninebark Virtual School	Junior High Mathematics	First Year	5 years
Bob	Ninebark Virtual School	Senior High Science and Physics	First year	1 year
John	Ninebark Virtual School	Senior High Mathematics	First year	6 years
Mary	Ninebark Virtual School	Junior High Social Studies	First year	1 year
Bruce	Mulberry Virtual School	Junior High Mathematics	Four years	13 years
George	Mulberry Virtual School	Junior High Science	Four years	12 years
Darren	Mulberry Virtual School	Junior High Social Studies	Three years	10 years
Greg	Elder Virtual School	Elementary/Junior/ Senior High Science and Senior High Biology	First year	11 years
Tyler	Elder Virtual School	Junior/Senior High Mathematics	Two years	15 years
Elsie	Sumac Virtual School	Junior/Senior High English	First year	15 years
Carol	Sumac Virtual School	Senior High Information Processing	First year	20 years
Owen	Sumac Virtual School	Junior/Senior High Science	First year	22 years

spouse who shared her passion for working long days. She remarked how important this was in her case as she had worked without a day off during the first three months.

Denise was also completing her first year of teaching online. Before being hired at NVS, Denise had spent a year at home after the birth of her first child. Her primary interest in applying to teach at an online school was the promise of working from home where she could both continue to care for her daughter and return to teaching. While a decision concerning teaching from home was still pending, Denise stated that:

> *One thing online education has allowed me to do, is to use my holiday days when she is sick. That is one of the best things for me personally with this job. I can stay home because we have to make up another month's worth of holidays throughout the year since we only get one month off at summer. I can also check up on important e-mails throughout the day when I'm at home to keep on top of things.*

During my initial research interview, Denise described how she had had little background in distance education or computers. She believed that her honesty in sharing her lack of prior experience was one of the factors which led to her hiring. She informed her future employer that

> *I don't have a bunch of computer know-how, that's for sure. I'd worked on both platforms, but it had been years ago. I was at home with my little one for a year and a half, and it doesn't take long to get out of the loop in an industry like this, so basically I started from scratch, but I think that was the one thing that helped me in my interview. I said, 'You've only got to tell me once.' I said, 'I learn fast.'*

She attributed her success in online teaching to her "*openness and flexibility*" to new ideas.

John, who taught senior high mathematics at NVS, was also in his first year of online teaching. He had moved from northern Alberta where he had taught mathematics to remote students for two years via fax and the Internet using correspondence materials from the Alberta Distance Learning Centre (ADLC). Like other teachers from NVS, John had spent the summer developing nine online mathematics courses 10, 13, 14 for grade 10, 20, 23, 24 for grade 11 and 30, 31, 33 for grade 12 to be ready for the opening of school in September 1998. John described his reasons for teaching for a online school as being able to work "*on the cutting edge; being computer-related; and supporting a different kind of learning where students are based in homes or in small schools.*"

A second set of compelling reasons was John's desire to concentrate on "teaching" rather than focusing on discipline and classroom management which had occupied much of his previous teaching experience. John felt that the contemporary classroom had become an environment where "*teaching was not optimal due to management issues*" and so had spent much of his time attending to the management of student behavior:

> *The discipline aspect is a lot easier here. In a classroom you're always on the defensive to some degree whereas in the online environment that's not the case, or much, much less the case. And you're dealing with teaching a lot more than classroom management. So those aspects are favorable.*

Bob was one of the first online teachers hired at NVS. He was completing his first year of teaching senior high science. During his last year of studies for his degree, Bob had worked part-time in the university unit responsible for integrating technology into teaching practices. While confident of his general computer skills, Bob found the opportunity to begin his teaching career in a setting that emphasized the development of content to have been very attractive to him:

> *I think it's the attraction that, being a first-year teacher, this is a phenomenal opportunity to get resources and develop resources, get into the curriculum, and really know how to do it. I think if I were to go into a classroom next year, I'd be a thousand times better off than I am right now.*

This emphasis on development of online materials and his use of technological skills, while an early inducement to seeking an online teaching position, later became one of the chief disadvantages of teaching online. He pointed out that the requirement to concurrently develop materials and teach online while remaining current with technological developments was a difficult balancing act for any teacher, let alone one in his first-year. Bob also emphasized that the opportunity to begin his teaching career in a position where he could develop skills that were applicable to both online and face-to-face was an unparalleled.

Mary was completing her first full year of teaching, having previously taught for six months in northern Alberta. Before relocating from eastern Canada, Mary had completed an undergraduate degree in education and a college certificate in computer programming. She had joined the NVS staff without a clear idea of what online education was and described how she had come to be teaching at NVS:

> *I just saw an ad in the paper that said for a online school and I then didn't even know that people were doing this type of stuff. I went and took the ad and went out to the library outside of the friend's house I was staying in, and looked up the school web site. It sounded very interesting, so I submitted a resume, I did an interview, was lucky enough to be offered a position, still, to be quite honest with you, vaguely familiar with what would be expected of me.*

Mary's position was unusual in that she had been hired after the beginning of school year and had assumed responsibility for the junior high social studies program previously developed and taught by Joan.

Mulberry Virtual School Teachers

Unlike NVS, Mulberry Virtual School (MVS) did not require teachers to work from its school site. Instead, all MVS teachers worked from their homes. This new flexibility with respect to teachers' working conditions and location was one of the hallmarks of MVS.

George taught junior and senior high school science for MVS. He had taught from home for four years having been one of the first teachers hired by the school when it opened in the fall of 1996. His bright and airy home was located on acreage one hour from an urban center. A bedroom on the second floor served as a home office (classroom). Equipped with two computers, a printer, a scanner, and a dialup modem, the office was outfitted with, as George stated, "the essential tools" of a online schoolteacher.

George described many benefits to teaching online and working from home. However, the greatest attraction to him was the opportunity to actively participate in the raising of his two daughters aged five and seven. The flexibility of teaching from home enabled him to share with his wife the responsibility for getting his daughters up each morning, eating breakfast as a family, and walking his daughters to the end of their long drive to catch the local school bus. After seeing his daughters off to school, George would begin his workday by logging on to the Internet and downloading his e-mail. Working from home allowed both George and his wife to share parenting responsibilities and tasks around the house. As George described this arrangement, his wife assisted him with some of the clerical tasks associated with teaching online thereby allowing him greater time to share tasks around the family home such as cooking lunch or dinner. In reflecting upon this arrangement, George depicted his work and home life in terms reminiscent of a pre-industrial cottage industry when families often lived and worked together on a family farm or produced goods from home. He described how he and his wife worked together:

> *Roxanne loves working on the computer. For her it's not even so much a job as just a break from household work, and so for her to download student work, it doesn't seem to be a task; it's just a break. And so while she's doing that, I can consider doing stuff like prepare a meal for supper, and so in a sense we're both getting a break from our work. She gets a break from her domestic work, and I get a break from something that is really quite a routine task and needs to be done.*

Bruce was one of the first teachers hired at MVS. He had spent 20 years in the telecommunications industry. Before returning to teaching, Bruce had worked as a private consultant for the local school district conducting workshops on new digital technologies and their potential impact on future educational practice. He lived in a quiet suburb near MVS. His teaching responsibilities were junior high mathematics. Bruce's "office" was located on the second floor of his two-story home where it doubled as the family's guest bedroom. The only hints that this was an office were the two computers, printer, scanner, and cable modem perched on a computer table located along one wall of the bedroom. No papers or books were in the room. Bruce explained that there was no need for paper, as the online school existed in a "digital environment."

Darren taught junior high social studies for MVS. He had worked from his urban home for three years. Darren taught out of a home office located in his basement and, unlike Greg and Bruce, Darren's office was crammed full of paper. It also housed six computers, CD-ROMS discs, recording equipment, many books on computers and teaching, and a numerous versions of approved provincial textbooks. Upon arriving to meet with Darren, I heard the sounds of his young daughter playing in the living room. Like Greg, Darren cited the advantage of being actively involved in raising his two young daughters as a major incentive to teaching online. He also spoke about his desire to teach "in the new world" of online education, but noted that the absence of a set workday and the lack of a physical separation of work from home also presented him with issues about boundaries:

> *It's been marvelous having the freedom and the flexibility, but I think we also talked a little bit earlier about, it's nice to go up and spend ten minutes and play with the kids but at the same time your work tends to extend to all hours; there are no limitations, really, with online hours. It's more of, instead of at the end of the day, there is no end of the day; you have to determine that, no, I'm going to be done by . . . . I can say without reservation, I've put more hours into this kind of teaching than I ever did in a traditional room, and anybody who is a special-ed. teacher knows the hours that you put into that.*

Elder Virtual School Teachers

Two teachers at EVS occupied a glass-sided office overlooking the computer lab. Both Greg and Tyler taught online and provided instructional support to students concurrently enrolled in online courses. Tyler was completing his first year of teaching full-time in the online program having previously divided his time between regular and online mathematics classes. His responsibilities included teaching mathematics to students from grades 7-12. He was also very involved in coaching and enjoyed the interaction that working from a school and coaching provided him. Indeed, his desire to maintain face-to-face contact with students was so great that Tyler suggested that if required to work from home he would more than likely consider returning to the classroom.

Greg was completing his first year of teaching science at EVS. His teaching responsibilities included teaching elementary and junior high science and senior high biology, and science. Greg had transferred from a medium sized K-9 school to the online school in the fall of 1998. His decision to teach online was mostly influenced by his desire to teach at the senior high school level. With only one senior high school in the local school district, the possibility of teaching senior high science at the local school was small. As Greg described his move, he spoke of teaching online as possibly an interim step which he hoped would result in either a senior high science position within another school district or perhaps as an interim step towards a full-time senior high science position. He also viewed teaching online as an opportunity to acquire the new skills which he hoped might allow him greater mobility within the teaching profession especially as more and more school districts moved towards offering online courses.

Yet Greg's interest in online teaching was not solely based on the opportunity to teach at the senior high level. As with many online teachers interviewed for this research, Greg described his interest in online teaching as working in a new field:

> *I think maybe the fact that it's cutting edge; it's new technology or something new in teaching. And it's always nice to be involved in something new. I like to be involved when things are starting up. So, those two things interested me. And I guess you don't look too far ahead, but looking ahead, first let's get them a resume, skills that you'll learn, and those skills that you can apply to any field, in the job, as well as teaching. So what I'm learning here can be applied to many different things.*

Greg's desire to work in a "cutting-edge" environment was certainly a theme that ran through my conversations with online teachers. Many saw online education as an opportunity to become involved in a new aspect of education that would, they believed create new career opportunities. Online teachers saw online teaching as one step along a continuum which could lead to administrative positions or employment in allied professions of training and staff development.

Sumac Virtual School Teachers

Three teachers were employed by Sumac Virtual School (SVS). This school was similar in organization to EVS in that it was physically located within a large regional high school with offices adjacent to a computer lab. The online school had grown out of an earlier district outreach program that had provided independent study options for home-schooling students within the district. With the opening of the online school, the options for independent study had expanded to include students from the local high school who were unable to schedule courses because of their timing or availability during the school year. Students who wished to accelerate their studies were also encouraged to register for online courses. The online school was also used by district and school administrators to offer educational services to students for whom attendance at school had proven problematic.

Elsie was completing her first year of teaching junior and senior high English at SVS. She had previously spent 10 years teaching night school adult upgrading courses at the local community college. As Elsie explained, her interest in returning to the public school system to teach online was primarily the joint appeal of pioneering new teaching methods using technology and the promise of teaching full-time from home. With three school-age children, Elsie hoped to continue volunteering at her daughter's school while also teaching during the day. Like many of her colleagues, Elsie described her prior experience with distance and online education before joining SVS as "*non-existent*." Her knowledge of Lotus Notes, which was used by SVS to create its teaching environment, was also elementary. Not surprisingly, the twin demands of acquiring new skills in both distance/online education and upgrading her computer skills while also teaching full-time contributed, as Elsie recounted, to a stressful first few months. She reported that while she had experienced her share of tears, other teachers at SVS had not fared as well. Two teachers had been compelled to take extended stress leaves during the first year of the online school's operation.

Carol also taught for SVS. She divided her time between teaching an online course in Information Processing with her role as an administrator of the high school. Carol spoke about how many regular high school teachers had benefited from the experience of teaching online. However, she was also careful to point out how for some teachers the twin responsibilities had been too much to cope with.

The final SVS participant in this study was Owen who taught junior and senior high science. Owen had taught for almost 20 years and had been involved in the application of technology to teaching for more than 10 years. He had authored provincial online resources in the areas of mathematics and science. Owen taught both in the SVS online school and the regular high school. These twin teaching responsibilities gave Owen insights into the difficulties that teachers faced in allocating time between both platforms. Owen also described the challenge of shifting his mindset between the two instructional platforms. In describing this mental transition he stated that he always had a feeling of being rushed and not fully devoting his complete attention to either teaching responsibility.

Summary

This chapter provided an introduction and general background to the online schools and the teachers involved in this study. The online teachers in this study provided interesting perspectives of the emerging online education sector in Alberta. The range of the teachers' backgrounds and their personal histories, their working conditions, and their generosity in giving access to their working environments and online courses led to an unparalleled opportunity to explore the current state of online education in Alberta. Descriptions of the 13 online teachers were included to provide an understanding of the personal qualities of the participants.

Online schools were also described in general terms to allow for a better understanding of the general context and "situatedness" in which teachers taught. Finally, this chapter placed teachers and their lives at the foundational level of this study–where the practice of online education begins.

Chapter 5

Professional Practices

Introduction

The professional practices in online education discussed in this chapter related to: course development; instruction; online teachers' perceptions about day-to-day interactions with students, parents, and colleagues; and student assessment. Within this domain of professional practices, questions arise about teachers' understandings of online education the variety, and type of tasks undertaken when developing online courses or materials, and who should be involved in planning for both interaction and assessment. How teachers deal with these questions is explored in this chapter.

In this study, teachers described their role in online education as comprising three overarching responsibilities (planning, teaching and interaction and assessment). Each responsibility involved a number of sub-tasks and operations which were related to issues about how teachers performed their teaching assignment. Teachers discussed at length (1) how they developed online materials and the challenges which teaching online presented when creating these materials for online students where bandwidth capacity was limited.

Teachers described (2) how they taught online and how an online environment required them to re-examine their previous classroom practices and training and to begin to think differently about the act of teaching. The use of web pages, online conferencing, e-mail, and print materials were discussed by teachers. Teachers described how each element was incorporated into their professional teaching practices.

The importance of interactions in developing and maintaining relationships with students, their parents, with other teachers and the challenges that these teachers faced in conceptualizing interaction in online education are explored. Orientation, callbacks, and the place of face-to-face interaction are considered along with the challenges associated with how to plan and organize parent-student-teacher meetings. Five types of interactions are discussed: (a) teacher-parent interactions, (b) teacher-teacher interactions, (c) teacher-student interactions, (d) student-student interactions, and (e) orientation and callbacks.

Teachers also spoke at length about (3) their struggles with issues surrounding online assessment and the difficulties associated with marking, testing students, and providing feedback online. They observed that the nature of online education, in which assignments were digital and marking involved providing feedback through e-mail, made the process of correcting student work more time-consuming and less satisfying to teachers.

The differences identified by teachers between their previous classroom interactions and their current practices were often referred to by participants to provide a more complete understanding of the effects that online education has had upon professional practices. Although discussed separately, aspects of professional practices often overlap, interact, and influence how teachers carry out their teaching responsibilities.

Development of Online Courses

All teachers reported that the development of online courses and associated online materials was a complex process involving many issues including pedagogical and technological considerations. One task they undertook as online teachers was the preparation of online course materials. The development of materials was usually undertaken by teachers who were also responsible for teaching online rather than by professional instructional designers. The complexity of developing online courses was equally felt by all teachers regardless of subject taught. All teachers described the their difficulty in balancing the competing demands for course development while concurrently teaching. Finally, all teachers described the problem of balancing their individual notions and desires for sophisticated course materials against their individual skill sets.

Puzzling over how online students best learned in an online environment required teachers to reflect upon their past professional experience and theoretical knowledge bases. Participants' reported mulling over how best to use the power inherent within emerging digital technologies to create maximal learning opportunities for students. While each teacher felt professionally comfortable and competent in planning for face-to-face learning, their confidence in designing learning opportunities for online students created a sense of uncertainty among some teachers. Many teachers reported feeling as though they were constructing solutions as they went along. As one teacher stated, she longed for some "certainty" in her development activities. "*There's no expert here showing me how to do this. And there's no formula for doing what we do here development-wise and content-wise, whereas I think there are more resources for a classroom teacher.*"

This lack of assuredness that teachers had felt as classroom teachers was a theme that commonly came up in discussions with online teachers. In some instances, "teacher uncertainty" stemmed from a lack of specific resources for online education and few opportunities for professional development. Unlike classroom teachers who could draw upon many teaching resources for classroom instruction, six online teachers felt as though they were required to develop all their teaching materials while simultaneously inventing online educational practice. Greg described the lack of online resources for online teachers in terms of what was available for classroom instruction:

> *There's lesson-plan books; there's how do you do an anticipatory set; there's all that stuff for that situation. You don't have that here, so you're creating from scratch, and you're trying to create the best thing for the kids that you can do on this platform.*

Some NVS online teachers likened the process of developing online courses to the difficulties of the early pioneers who struck out boldly and moved to a new continent without a clear notion of what they might face. Pioneering required individuals to leave their county of origin, where rules were known and geography was understood, for a new land where one of the first tasks confronting newcomers was appreciating how different their new environment was. They described their first few months as one of pioneering a new country. However, the act of pioneering was not one that was equally shared among all online teachers. In some cases teachers reported they were pioneering while others were building permanent settlements. John described his feeling in this way:

> *I see us in the online environment a lot like the pioneers who perhaps first came out to this country. The difference between the pioneers and us is that the pioneers were similar. The pioneers were breaking new ground. They didn't know how to function because this was a new climate, a new area. They were restricted in the tools that they could have, and so on and so forth, and so there's a lot of learning. But one difference is that the pioneers did not have people that were well developed working right alongside them and that they had to compete with these people who were well developed, whereas we in the online environment are working alongside schools that have been in existence for ages. We have to figure out how to plow the field: meanwhile the neighbor is working on enhancing his finely tuned equipment to do a slightly better job. So we're really under the gun in a lot of ways. So we want to be able to develop and be as good as the neighbor.*

The complexity of pioneering new teaching practices and new online course materials raised a number of other issues for teachers. Teachers commonly felt adrift without a pre-service or professional knowledge base to draw upon when confronted with problems. In the absence of any certainty of direction, and lacking a solid theoretical framework to draw upon, teachers reported resorting to familiar models from their previous classroom experiences. One teacher described her decision to resort to past practices for organizing and developing online materials as one of personal survival and described this reliance upon the familiar as

> *this is what I'm used to and this is how I function in a sense. The online-school environment is a creation of the teacher or developer, and so perhaps I don't know sufficient alternatives to this model, so one reason is just lack of exposure to other ways of doing it.*

While not all teachers adopted familiar models based upon their classroom experience, five models emerged when teachers began to discuss how their online courses were organized. Four of the five instructional design models were based on archetypes found in traditional classroom practices, while a final design model followed more closely a model found in more traditional distance education environments. The six models which online teachers reported using to develop online course materials are discussed below.

The Textbook Metaphor

While shadowing online teachers and discussing with them how they thought about developing online courses, a common theme emerged. Teachers reported that they often felt that creating online courses was a complex task generating a profusion of decisions, the first being how best to organize an online course. This task was made more difficult when, as many teachers reported, they had little or no professional preparation about dealing with instructional design for distance education. In the absence of either prior experience in teaching at a distance or professional knowledge about it, some teachers reported resorting to what is best described as a "textbook" metaphor of instructional design.

Underscoring the use of "the textbook metaphor" for developing online courses were a number of core assumptions about how learning was best organized and what materials best complemented the use of a book to sequence teaching and learning. One of the chief features of this metaphor was the use of the textbook as a skeleton upon which an online course was hung. Online courses would closely follow a provincially approved textbook. Assignments, activities, and materials based on the organization and content of the text would be developed. Pacing, chapter headings, and the inherent linear format found within the text were followed. Those who reported using textbooks to organize their online courses cited a number of reasons for doing so.

Reliance upon a textbook for organizational structure was often explained by online teachers in terms of its close correspondence to the Program of Studies. Teachers often spoke of how closely some texts mirrored the curriculum or how well a particular text covered certain course topics. In addition, teachers described how a textbook minimized the amount of reading students were required to do online. Greg reported using a textbook as his course metaphor because he believed that

> *we minimize the reading, which means maximizing the textbook. We felt that the modules never really maximized the use of the textbook. There was a tendency, almost a redundancy, of rewriting a lot of the same things over again where they could have referenced the textbook instead. So we textbook-wrapped the course, where you get a daily lesson. The first thing you do, typically, in a day is to read the textbook, three or four pages.*

Other teachers remarked that textbooks also provided a more efficient method of presenting material. Citing the difficulty of reading text on a screen one teacher described how he used a textbook: "*We always see that the course will always have a textbook. I think it's important that the kids have some paper-based materials to go to, simply because reading off the computer screen isn't all it's cut out to be.*"

Bruce explained that he used textbooks to teach online when it provided an introduction to a lesson. According to Bruce, an additional benefit in relying upon a textbook to anchor his online course was its familiarity to students. He explained how he used textbooks in his online mathematics course:

> *We're using an approved textbook,* Minds on Math, *and we're just following it cover to cover. They would then work through the assignment using the textbook. There are questions, standards basically, that we set up. Questions that are in blue are typically out of the textbook. They answer these questions, and compare their answers to those supplied at the back of the book. Those are questions that I don't correct. If they have questions about it, then they'll email me if they don't understand or get it, but it's kind of a practice.*

He elaborated upon this point by explaining that by virtue of the relative youth and rapid growth of online education, online students were as likely to have attended regular schools as having been home-schooled. Thus, many students were familiar with teachers and their use of textbooks, and this gave new online students a familiar instructional pattern to follow easing the transition to a new learning environment.

In summary, the impetus to build an online course around a particular textbook provided teachers not only with a linear sequential organizational metaphor to follow--with each chapter requiring a student to complete and submit an assignment--but also provided teachers with some confidence that they were thoroughly teaching all aspects of the curriculum. To some extent, use of the textbook metaphor gave teachers an external benchmark upon which to judge their efforts at adequately covering provincially mandated curriculum. To some extent the use of a textbook provided a convenient mirror to measure quality control. Online materials, assignments, and lessons could be judged against the content and design found in the text. Textbooks also allowed teachers to use previously developed classroom materials within their online courses. Question banks, classroom assignments, and projects could be "re-purposed" for online courses.

The Program of Studies Metaphor

While some teachers described using a textbook metaphor as the architecture for their online courses, other teachers spoke about developing course content based primarily upon the provincial Program of Studies. The provincially mandated Program of Studies, is according to Alberta Learning, (1999), "the required expectations for the core and optional learning components for elementary, junior and senior high schools. Content is focused on what students are expected to know and be able to do."

The Program of Studies outlines the expected learning outcomes which teachers are required to plan for and address in their teaching. However, the Program of Studies does not mention nor does it require a particular teaching style. Rather, Alberta Learning leaves instructional decisions to both school districts and teachers. However, Alberta Learning does maintain an interest in instruction through its policy of administering yearly provincial Achievement Tests for students in grades, 3, 6, and 9 and Diploma Examinations for students in grade 12. The goal of this provincial testing initiative was to provide parents and teachers with a means by which they could compare the progress of students to provincial norms and identify weaknesses in their performance so remedial measures could be taken (personal communication, Dr. Jim Dueck Assistant Deputy Minister, System Improvement and Reporting, Alberta Learning). Provincial testing results are measures by which schools and school districts can be held accountable (Alberta Learning, 1999a; 1999b).

For those teachers who adopted a Program of Studies Metaphor for purposes of planning and designing online courses, the decision to do so was explained in terms of ensuring that students were well prepared for provincial examinations and competent in the required skills for their succeeding grade level. In describing why he chose to use a program of studies metaphor, Greg described his decision in terms of student outcomes: "*There is a Program of Studies for Science 8 that the students need to at least cover; how well they do in it is up to the individual students.*"

Yet, unlike the bounded nature of the textbook metaphor , which presupposed that the textbook contained a curricular map which if followed would ensure that students had mastered a particular set of knowledge, the program of studies metaphor assumed that the task of teachers was to assist students in meeting provincially mandated outcomes. Therefore, teachers often viewed the Program of Studies as a minimum standard upon which to develop course content. Teachers used the Program of Studies Metaphor to develop course content recognizing that they would beheld accountable by administrators and parents for adequate student achievement.

The Examinations Metaphor

Alberta is one of a number of Canadian provinces that has established provincial examinations/tests for students in grades 3, 6, 9 and 12. Achievement examinations are administered to all Alberta's students in core subject areas of English, Social Studies, Mathematics, and Science. At the grade 12 level provincial examinations are known as Diploma Examinations. Students in grade 12 must pass the provincial Diploma Examination to graduate from high school. The stated aim of the examination process, as stated by Alberta Learning officials, has been to assess students' performance across the province. Yet, the recent practice by local and provincial newspapers to publish aggregate district and school results has created an environment where many teachers feel pressured to teach to the examination. This is as true in online education as it is in traditional school settings. Another use of the Diploma examinations is by postsecondary institutions when making decisions concerning admittance to colleges and universities.

One consequence of Alberta news outlets deciding to publish examination marks has been that all teachers, including online teachers, report feeling constrained in experimenting or deviating from the program of studies in fear that students will be unprepared for the provincial examinations.

This reduction in teachers' latitude, to engage in innovative practices along with their anxiety about the reporting of poor examination results by the media were often mentioned during interviews. Teachers felt that the requirement to prepare students for provincial examinations created an environment where experimentation could lead to criticism by parents or system administrators. Darren spoke about the restraint he felt concerning the provincial examinations and the necessity of presenting the curriculum in ways that privileged information transmission over knowledge building:

> *But we could do more, which may not be precisely what is being asked for as far as the curriculum goes, but in the real world some of the things that we could do with the technology are just--I'll give you an example. If I had to do a Social 30, I've got to get through a tremendous amount of material in X amount of time, and it's just boom, boom, boom; you've got no time. But if I had two months free, you could literally have an online project with a social class in Russia where they would learn more about another country and the economics and the--. You just don't have time to do it, but the potential is there.*

Similarly, Joan reported on the influence that provincial testing had had on her course design. She explained that the school had a goal of increasing the percentage of students writing achievement tests. This goal had been adopted in response to questions about instructional quality associated with online education.

Online school administrators from the four online schools also reported feeling some pressure to demonstrate that online education generally and their program more specifically were preparing students appropriately for provincial examinations. They felt that their school districts' central office personnel were looking at district results with the goal of making comparisons between online and face-to-face programs. Also, informal conversations with their colleagues had raised the issue of student performance on provincial examinations. Online administrators at MVS and SVS had shared these concerns with their staff over student performance.

Notwithstanding public statements by government officials concerning student achievement on provincial examinations as providing only one measure among many of student achievement provincial testing had become a measure by which districts, schools, and program metaphor s were increasingly being judged according to the teachers. They described feeling doubly pressured in that they were being judged not only on their individual teaching competence but also on the attributes of online education.

The Timetable Metaphor

With respect to the process that they followed in developing online resources and courses four teachers described adopting an approach which was closely aligned with an online timetable. This use of a daily or weekly timetable as a metaphor underlying course development combined attention to the Program of Studies with focus upon the traditional rhythms of the classroom. Teachers who had adopted the notion of time as the primary organizational variable would often describe how in designing an online course they would first review the Program of Studies and section it into units or themes. Each unit would then be divided into assignments which would be reviewed to identify the necessary materials including textbook readings, available online resources, previous learning, and new skill sets associated with the unit and activities which students would complete independently. Teachers would then assign a time-to-completion factor to each activity or unit. In some cases teachers decided to parse study and assignment activities into daily units. While the content of online courses was drawn from a number of pedagogical metaphor s, for online teachers who had a significant proportion in their online students concurrently enrolled in regular classes, the issue of pacing and time requirements were significant.

Further, students who enrolled for a single online course while maintaining a full or nearly full course load in their traditional school often used the school computer lab during the school day to access online course materials, communicate with their teachers, and complete online assignments. Consequently, many teachers felt a responsibility to construct courses that were similar to, or at least minimized the variance in time required to complete online high school courses and regular high school courses. Bob described his planning process in the following terms:

> *We looked at the course and said, "Okay, a standard, five-credit course requires a 125 instructional hours in a classroom." We said, "How many days typically are there in a school year?" because we have a large number of Contracted Services students (concurrently enrolled students) that were on a regular school year. It's about eighty*

> *days, so that translates into about 90 minutes a day. So what we did was, we took the course and we broke it down into 80 daily lessons, so that a student goes onto the computer, can take your day, we're on Day 3, this is a 90 minute chunk of time; it's supposed to take me about ninety minutes to do all the work and the reading and the assignment, and then I'm done that 90 minutes.*

Still John described his thinking around the use of a timetable metaphor in developing online courses in terms of the amount of time students had during their regular school day to study for their online course. As John observed, with more than 50% of his online students from regular school settings, he was conscious of their dominant learning environment and wished to complement rather than radically depart from their existing learning habits.

Bob stated that many students needed structure so the highly structured metaphor of planning based on time-on-task was of benefit to students where supervision by responsible adults may have been imperfect. He described the feedback he received from in-school personnel, parents, and students about his sequential time-based planning:

> *The feedback we've got on it has been fantastic from the Contracted Services and the home kids. The home kids like it because it keeps them on track, even though they have the freedom to move wherever they want to go and go as fast as they want to go. A lot of the kids need structure; they need to have something or someone saying, "This is due today; this is due tomorrow." Some of the kids really need that, even at home.*

Inasmuch as the notion of a timetable in online courses may seem to be a vestige of face-to-face teaching, it certainly made sense to those teachers who were principally involved in the delivery of courses to students in traditional school settings. Attention to time also provided teachers with valuable insights into their expectations about student workloads because they were faced with the delicate act of balancing teacher, student, and parent expectations around outcomes and standards which were still being negotiated in online education. This was an important consideration when, as Kemp et al. (1998) pointed out, educators moving from face-to-face to online delivery were required to retain the same content and assignment expectations without the additional time required to complete online courses. They observed that this had become a prevalent feature of online education. By borrowing the notion of traditional time on task and attention to pacing and workload, these online teachers hoped to avoid the concern of "over stuffing" their online courses.

The Classroom Metaphor

To some extent, all the teachers were captive to their previous successes or failures. Within the arena of online education and more specifically in the development of online courses, the experiences that teachers brought from the classroom affected how online education was viewed. Previous classroom teaching experience and the familiarity of having been educated in a classroom influenced how some online teachers viewed online education. For some, online education was viewed as but another variant of the classroom experience. All teachers spoke about how online education was different from the traditional classroom yet they used the classroom as their reference point when discussing their online practices. George used his previous experiences to describe his online teaching experience in these words:

> *It's almost like, in the traditional classroom there's the teacher and the class, and you have a class of 25 students, but it's a class of 25. I look at it now as a teacher, and I have 25 little classes that all happen to be at the Grade 6 level, because they don't get to interact with each other; they only get to interact with me, at this point.*

Online teachers often used terms such as "classes, attendance, daily or weekly assignments and time-on-task" without distinguishing between online and face-to-face teaching.

For some, online teaching was a simple matter of organizing courses around sequential tasks. Teachers who thought of online teaching as an activity similar to classroom teaching followed similar routines to those found in face-to-face teaching. Instruction centered around teachers introducing lessons through either an e-mail message or through incorporating an introduction into an assignment as a series of paragraphs preceding an assignment. Then teachers would direct students to undertake the task of reading or researching a specific skill or topic either online or through the use of print materials such as textbooks or other reference materials. Next, teachers would assign students guided practice supervised by a parent or another responsible adult for students who were concurrently enrolled in online and traditional classes. Finally, students would complete an assignment or project independently and submit this assignment to the online teacher for assessment. In the classroom metaphor, online teachers occupied a central position within the teaching learning process through their role as facilitator and director of student learning. In addition, teachers assumed the central role in assessing student progress.

Bob described his thoughts about how to design online courses in the following terms:

> *The way we structure our courses. It's structured so that a student in a classroom can follow a daily timetable where those days are broken down in each unit, because we have a large percentage of our kids work out of a school; more than 50% work out of a school and have a regular school day. So we structure our courses in a way that the school student can sit in front of a computer and have an 80 minute or a 90 minute chunk of time: This is what I do today; tomorrow I go to the next chunk. And by doing that we don't hold the home student back, because they can do Day 1, 2, 3 today; skip five days, do 4, 5, 6 a week later. So they can still work at their own pace, but we've provided more structure for the school students.*

The use of the classroom metaphor was not limited to the area of instructional design. In many cases, teachers used traditional classroom metaphors when explaining activities to students. Teachers often used terms such as weekly or daily timelines when describing assignment schedules. Rather than adopting the notion of "anytime anywhere education" associated with online education, some teachers either consciously or unconsciously adopted the "familiar" over the new. When this was pointed out during interviews more often than not responses were similar to those of Denise who explained her use of the term "binder" when describing how students should save digital files on their computers and the protocol for naming computer files before sending them to her:

> *That's their point of reference. Most of them were in a school system prior to this, and if not, they know what it is to start a binder at the beginning of the year regardless; whereas if you say it's like creating a new folder, and you use that folder some of them don't know the difference between a file and a folder.*

While the classroom metaphor was a powerful attraction to teachers when first beginning to work in an online environment, it began to fade in its power to define schooling as teachers gained more experience. For teachers who had taught online for some years, their discussions around content development began to acquire more of a flavor deriving from the rich history of distance education. Darren and George often spoke of flexible timelines, the role of interaction in teaching and learning, and the importance of knowing one's audience in developing online courses. Those teachers in this study who had limited online experience may have focused their efforts at replicating the classroom experience in their online teaching to a greater extent than they would have if they had been more experienced with online education.

The Instructional Design Metaphor

While some teachers thought of instructional design, content development, and course construction in terms of their previous classroom experience, others undertook the task of instructional design from a perspective more closely reflecting aspects of traditional instructional design found within distance education literature. Rather than beginning with the program of studies, a textbook, the classroom, preparation for provincial examinations, or building courses around a traditional school timetable, some teachers began with an analysis of student needs, followed by design and development, and concluded with implementation and evaluation.

Darren explained how he went about developing online courses. His first task was to first consider the learner and the tasks and skills that students would require to complete an online course. He would then review the program of studies, inventory of course materials from the classroom, any print materials (usually textbooks) which students would routinely receive when registering for an online course, and digital resources (CD-ROMs), and then begin to ask a series of questions. What would students at this grade level find interesting? What do they need to know this year? What skills do they need to master for the next grade? What should the assignments and online materials look like to maximize online student learning? Darren elaborated in the following terms:

> *And then I'll look at what I'm trying to get across: Now, how can I enhance this? Or what do I know that I've come across on my own, certainly on the Net or what have you that could enhance this in terms of a sound file or a video file? You do have to think of what's appropriate, and there have been things that really fit, but then it may be misconstrued or whatever; can't use that. Or I'll have an idea, and I may end up having to develop something from scratch, which I've done occasionally. I guess it's just trying to put yourself into the lesson, trying to make it a better learning experience for the kid.*

In planning his online course, Darren also spoke about the importance of keeping the age and background of his students in mind. He described how he would try to imagine the student studying from home or in school and attempt to develop materials which would appeal to a student while also addressing the intended learning outcomes. The planning process therefore involved considerations around the learner, the content, and the intended learning outcomes. Course planning progressed from the level of a complete course to the lesson level. Darren stated that

> *I think primarily I plan out the lesson initially: What do I want to get across, and what's the text? And then from there, when I feel like I've got that basis to work on, then I'll start working, and then I'll generally say, Gee, we've been going on a long time. This is starting to sound dry to me. I need to interject it with something that's different. Or how can I enhance this? What's going to perk that kid up and catch their*

> *attention? So a lot of the multimedia that would be the 3-D stuff this year comes in after the basic lesson.*

Another feature of the instructional design metaphor that teachers remarked upon concerned the process used in constantly revising their courses. Revising courses involved receiving feedback from students and parents. Yet, despite their hope that students would feel free to comment on and make suggestions for improving online courses, to date teachers had been disappointed with the responses from parents and students. Few students had responded to requests from teachers to comment upon and make suggestions for the improvement of course materials. In a few cases where students had responded, they had responded positively and had few, if any, suggestions for improvement.

Parental feedback was also informally sought by online teachers. Online teachers felt that parents of online students were more inclined to comment upon online courses than parents of students in traditional classroom environments. In one case, a parent had commented upon the grammar and spelling used in an online assignment. In other cases, parents had commented upon the size of assignments (file size rather than the amount of instructional content) that teachers were sending out to families who lived in low bandwidth locations. Moreover, a science teacher remarked upon how a parent had provided detailed feedback around an experiment which required a child to complete a science experiment using a candle outside his home. In this particular case, the family lived in Saudi Arabia and the heat of the desert melted the candle before the experiment could be finished. The feedback from parents was considered important and handled in a "service-oriented" manner with teachers responding to parents through e-mail explaining why the inclusion of a particular experiment or assignment was included in a particular course.

In all cases, online schools in this study had either formally or informally adopted policies about when parents might reasonably expect a response from teachers. For the most part, online schools had implemented policies through which parents could expect a response within 24 hours. While parents were not interviewed during this research project, teachers reported that parents appreciated the invitation to comment on course materials or other features of their children's education. Not all parents felt the need to comment upon the content of courses, but teachers reported they had received more feedback from parents than they had expected.

Teachers generally reported that improving online courses was a constant process made more important by the haste with which many courses were first developed. Almost all teachers reported that they had initially developed courses as efforts at "survival." The imperative to create online courses for the beginning of the school year was such that many teachers reported developing materials that while adequate —that is to say educationally sound—lacked many of the interactive elements or the integrated projects that many teachers wished for.

When prompted to reflect upon their initial development of course materials, all teachers reported that their overriding concern had been to ensure that complete course skeletons were available by late August of each year. This was especially true within the online schools NVS and SVS that had adopted a policy of self-paced courses. Teachers felt that "self-paced" courses required all online material to be available when students first registered and entered their courses. This felt need to have completed courses available for the opening of the school resulted in courses which were based on "a survival metaphor" rather than upon an ordered process of developing online course materials. Consequently, teachers commonly spoke of the need to improve their online courses. As Joan make clear her goal was to incorporate improvements into her course over the upcoming summer:

> *That's why I'm excited about the next phase of development, because the survival end of it's done. It's dry; it's done. But I think there's so much you could do with science online between animations and video and even getting them to do more labs at home that maybe don't even necessarily rely on the lab kit per se, but maybe more kitchen chemistry in the junior high level, where they can get into the kitchen and create something and then give feedback.*

Most online teachers reported that they expected to spend at least part of the summer revising their online courses so that they would be improved.

Transparency of Online Teaching

Although all schools used some form of password protection to control unauthorized access to online course materials, the nature of the Internet and the ease with which passwords could be shared resulted in online courses that were for all intents and purposes "transparent" to the general public including parents, other students and teachers from other online schools. The use of passwords to protect unauthorized visits to online courses, and to fully restrict access to authorized persons to course sites is impossible. The ability of the general public to look at online courses concerned teachers who felt that unauthorized access to their courses created an environment in which their professional practice was publicly exposed in ways that face-to-face education was not. Public scrutiny of online courses was viewed by online teachers as similar to teaching within a fish bowl. This belief was strengthened when teachers spoke of their "professional" practice in terms of the materials they had developed. Public review of materials was equated to public review of their teaching competency. This serious concern about public scrutiny was best illustrated when an online teacher from NVS described how she had received a long e-mail from a parent who had reviewed an online assignment and had returned it with a myriad of recommendations concerning revisions to the grammar used in the assignment. While parental interest was appreciated this new relationship required that all exercise tact and sensitivity. All teachers reported that they had needed time to feel comfortable with the new interest that parents showed in reviewing online course materials.

Public exposure to their online courses also produced uneasiness among teachers about the "quality" of courses they had developed. Teachers felt that they were expected by parents to have all course materials available before the opening of school each year. This was certainly the case at NVS where teachers had been hired in June to develop courses for September. It was also one reason why the school administration had sought permission to use the electronic files from existing correspondence courses from the provincial government. It was hoped that the materials, while not fully suitable for online delivery, would at least shorten the time required for course development. Joan described her first few months developing courses for NVS:

> *We were brought in July second. By the end of August we had to have something on line, because there wasn't anything on line that was workable. Now, the online principal gave us the go-head: "Be creative. You're the teacher in your classroom. Decide what you want to do." I felt that for a course to be ready for the opening of school required that it be completely developed.*

The necessity to develop courses in restricted time frames led all online teachers to talk about their concerns about possible criticism to which their individual courses might be subjected. While the "standard" which they wished their courses to emulate was not one which teachers could define with great certainty, their desire to incorporate the look and feel of multimedia products such as Microsoft Encarta® was often mentioned as a goal. All online teachers wished to move away from text-based courses to online courses which incorporated multimedia components such as video, pictures, and active demonstration of complex topics.

Copyright

Content development for online education involves the ability to find and use free content from the Internet. This has presented teachers with new issues about ethical and legal questions pertaining to "acceptable use" of digital content. To understand teachers' concerns about acceptable use the digital environment in which they work must clearly be understood. The online environment and its reliance upon digital technologies have made the use of and re-purposing of web materials relatively easy. Technologies associated with the Internet make it possible to copy images, sounds, video clips, or whole web sites by either highlighting the site and copying it to the hard drive or right clicking on an image and pasting it into a new document. The ease with which files can be copied is also true for content from CDROMS or with other digital resources. This was one of the original strengths of the Internet, but it was also one that presented teachers with ethical concerns about what can and should be used when developing online courses.

While teachers were sure about the procedures concerning how to acknowledge written material in the classroom and the protocols associated with linking to a web site, the requirement to credit a web site author when sending students to the site are less clear. In addition, the requirements about using or "borrowing" pictures or other smaller digital components such as sound clips and QuickTime® movies from public sites such as the Canadian Broadcasting Corporation website produced unease among online teachers. As some teachers stated, if they expected students to produce original work without cutting and pasting content from the web for their online assignments, how could they in turn borrow materials to create online courses? Questions concerning how to cite and use digital material were further compounded by the fact that many online teachers reported difficulties in developing materials with few of the supports often found in traditional distance education institutions such as graphic designers, instructional designers, or multimedia authors.

Every online teacher expressed concern about the pressure to develop online courses which were more than just text on a screen. They felt pressured to move from a metaphor based on the creation of an online textbook to one where students would learn from the use of multimedia materials and so they sought to seek out existing online materials for their courses. Teachers reported using image files found on the Internet, and sound clips to enhance their course materials. In some cases teachers demonstrated how they had incorporated simulations or content from other web sites into their courses. Another reason which teachers cited for using online materials was a desire to create a rich multi-media environment that could replicate to some extent the rich communication found in face-to-face settings. In other cases, teachers wished to provide the "best educational materials" that were available to "their students."

However, in the online environment teachers felt a sense of exposure to public scrutiny by posting their assignments and educational resources to the Internet. Colleagues, school administrators, and the general public have a window seat looking into the online classroom and therefore the ability to inspect and comment upon the materials prepared by teachers. Consequently, these online teachers were more concerned with and were reluctant to misuse online multimedia materials, while at the same time, being held to expectations to use varied types of materials often available on the Internet.

While the use of Internet materials was a widely shared concern among online teachers so too was the use of other forms of media. Elsie explained how she wanted to use a videotaped movie for her English 30 class. When teaching in a classroom she has either borrowed the tape from the Instructional Media Center or had taped movies from television to show her students. She had never been troubled about whether this was legal or not. But she was now concerned about the use of such material when to get it into the hands of her students she now was required to either make copies of the videotape and send them by post to students or to set up a lending library of videotapes she had used in her classroom. Clearly, the move to a online platform from a face-to-face environment challenged teachers to think more carefully about copyright. She described her dilemma in this way:

> *It was a matter of just not thinking that far-or knowing that I could do that. Or, again, can I copy the tape? Because I'm really worried that we're going to get nailed on copyright, and I don't want it to be me. I would like to think that I'm much more responsible than that, and I don't want to be this teacher who had all these things, but she did it all wrong. That's not the way you did it. So I thought I'll send them out; I know they're for educational purposes, but if I copy them and send them out, I'm sure that's got to be a violation at some time.*

A final copyright matter reported by teachers involved confusion about the use of other web sites to augment their online courses. All online teachers referred to other web sites as part of their online courses. In some cases, teachers had used web sites as a basis of their assignments. While this ability to hyperlink to information posted anywhere in the world was one of the founding principles of the Internet (Berners-Lee, 1999), recent controversy had arisen around the practice of linking to web sites without prior approval. Whereas most of the arguments about acceptable use had originated in the United States, the reporting of legal cases from south of the border had seriously affected how some teachers felt about the practice of linking to sites. One teacher had begun to seek permission from web masters to link to their site. For some teachers the issue of copyright was less a concern when linking to web sites than was whether the site would be maintained. Bob described his fear of copyright and linking to web sites:

> *That's our fear, is that they're going to go down. If we maintained them, if we created them and put them on our server and we were responsible, then you could use them as the sole component of the lesson. But when we're not maintaining them, you never know. Or when this guy's going to say, "Okay, that's it, five bucks a kid from now on. This is so popular I'm going to charge for it," we can't afford to do that; you've lost your link there too.*

Interactions

Interactions of various types—teacher-parent, teacher-teacher, and teacher-student—constituted an important aspect of professional teaching practice of the online teachers Interactions with parents was one area in which teachers reported significant differences between their online teaching experiences and prior classroom assignments. The teachers felt that parents were more willing to contact them concerning the progress of their children. Conversations with parents involved greater discussion about pedagogical issues and were more often focused on student learning than they had been in traditional school settings.

Teachers also reported greater interactions between colleagues. All teachers observed that communication between themselves was heightened because of the ease to which they could communicate and by their need to share information about the students they were teaching.

Interactions among students were altered in an online environment. Teachers commented upon how interaction was of a different kind where students relied upon e-mail or synchronous chat rooms to communicate.

However, while interaction was heightened between teachers and parents and teachers and colleagues, interaction between teachers and students was less than in traditional school settings. Each interviewed teachers commented the lack of ongoing communication with students and their desire to find new ways to establish regular interaction with students.

Teacher-Parent Interactions

Teachers described how communication between parents and teachers in regular schools was frequently restricted to receipt of newsletters and attendance at events such as assemblies or musical performances. While many reasons exist for limited interaction between parents and teachers in traditional schools, one reason suggested by teachers was the difficulty that both teachers and parents face in attempting to contact each other. Few teachers in traditional schools enjoy ready access to computers and e-mail. Telephones, where available, are often located some distance from classrooms. As a result, telephone contact between parents and teachers is often a result of significant efforts by both parent and teacher, according to the interviewed teachers. In contrast, the interviewed teachers reported having access to an array of communication devices in their online positions. They taught in environments where telephones were considered essential tools for communication. Whether from home or from office cubicles or from school offices, all teachers had access to a telephone. The use of voice mail and other messaging systems encouraged both parents and students to leave messages for teachers. Access to the Internet meant that online teachers had access to e-mail from home and from work.

Also, teachers commented that the ease with which communication was possible was one component of a wider phenomenon of greater interaction between home and school (see Figure 5.1).

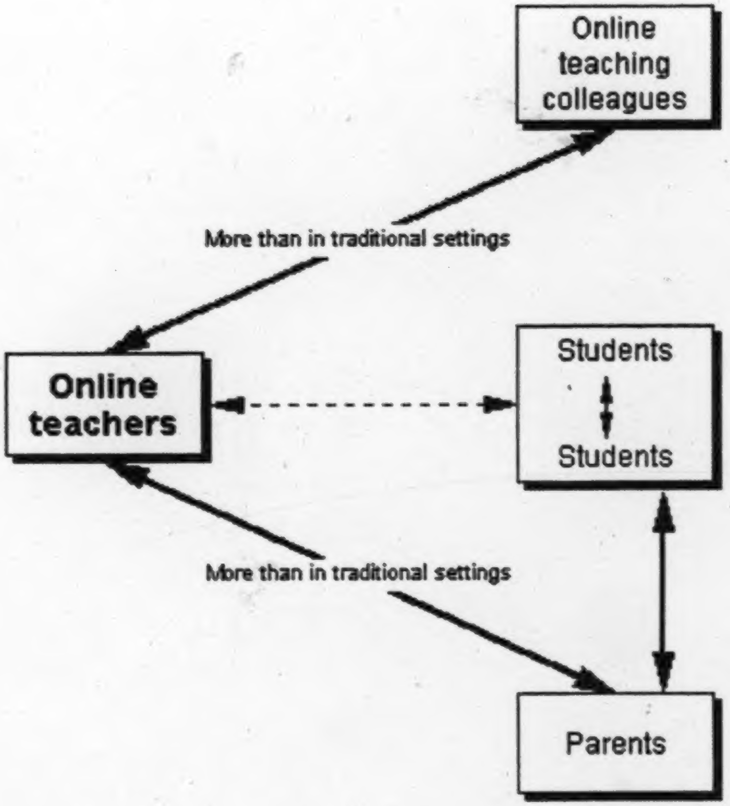
Online teaching colleagues
More than in traditional settings
Online teachers
Students
Students
More than in traditional settings
Parents

Figure 5.1. Online interactions among teachers, colleagues, students, and parents.

They reported that, while communication was doubtlessly easier with better access between home and school, parental knowledge about their children's assignments and their progress encouraged parents to become more involved and more willing to contact teachers if they had any concerns.

Teachers described one of the fundamental differences between traditional education and online education as being in the access that parents had to their children's schooling environment. Rather than having their children's educational experience filtered and interpreted through the lenses of their children, parents of online students had direct access to the "classroom." Parents could see their children's schoolwork and assignments at any time simply by looking at their children's work online. All teachers pointed out that information about projects in progress, course assignments, recent grades, and interactions between teacher and student was now available to parents. This unprecedented admittance to the schooling environment gave parents new ways to discuss their children's progress and to collaborate with educators.

Parental presence. Carol described the altered role of parents in online education and her sense of parental "presence" within the online classroom in this way:

> *The parents that are home-schooling or have their students at home, whether they're providing the instruction or whether it's coming through a online environment, they're different parents, than the ones who send their kids to school. They tend to be more involved in everything that's happening with their students. The parents who send their kids to school, they don't come with them [Carol's emphasis]. They send them; they don't worry about them while you've got them: "When I want to know anything, I'll phone you; or heaven forbid, you phone me when you've got a problem." The parents who are used to working with their kids in a home-schooling environment or have them at home in a online environment, they're involved with those students all day, every day, or they should be. The ones who haven't been have found that their kids are getting into things that they don't want them into, so those parents are on the phone a lot to us. They're working with their kids a lot; they know what's in there. They know everything their kids are doing. They'll let you know something they thought was really great, something they thought was the pits, and "You should change that*

> *assignment. It's awful." We don't get that level of interest from traditional parents.*

The notion that parents "attended school" with their children was echoed by Darren who reported that he received comments from parents concerning the progress of their children arising from their increased access and therefore their "presence" within the online classroom:

> *I have as much communication with the parents as I do with the students. I'm frequently communicating with them, or if it's an evaluation, they write back. Sometimes the parents write back with questions about a particular lesson, because the thing that is different as well is that everything that I do as far as a lesson goes or what I teach in a classroom the parents have access to and can see and can evaluate, much more so than a traditional classroom. The student goes home in a traditional environment, and the parents ask, "What did you do today?" and they may have something to show for the day or they may not. Literally everything that we send out to the kids is accessible to the parents. They know exactly what we're doing, exactly. And a lot of times parents will write back and say a suggestion or a comment or "I like the way this is being done." I've got all kinds of interesting feedback, and I think in the end it's made my teaching better, because they've had very good suggestions, or they help me with pacing, and how fast I can go with the lessons.*

Carol and Darren characterized online education as an environment where parents are no longer strangers peering through a classroom window but are sitting beside their children in the online classroom.

Parents as partners. According to all teachers, parents played a critical role in the success of online education. Unlike parents of students in traditional schooling whose roles were often restricted to supporting the classroom teacher and monitoring homework completion, online parents were called upon by teachers to assume duties previously performed by classroom teachers.

Parents in an online environment were requested to establish an environment at home that was conducive to children's education. They were advised to set up a study space for students that could be easily monitored by the parents at home. For younger students, parents were advised to place the computer in a public space such as kitchen or living room where parents could provide ready assistance if necessary. For students of high school age, parents were encouraged to monitor student study habits and assume joint responsibility with the online teacher to monitor student progress. Online teachers provided a course assignment timeline identifying when assignments would be expected to be completed to assist parents in supervising their children's day-to-day progress. Monitoring of student progress was seen by teachers to be a responsibility of parents as well as teachers.

Teachers spoke of the importance they placed on parental assistance by encouraging students when encountering problems with assignments to first consult their parents for guidance. As teachers stated, parents can answer questions immediately while a teacher's responses require that a student wait for an e-mail or a telephone call from a teacher. Teachers feared that the lag time between encountering a problem and the arrival of an answer would seriously disrupt the learning process.

Parents were also encouraged by teachers to participate in their children's education by assisting in setting up and supervising science experiments. The four online schools provided students with science kits at the beginning of each year. The kit contained ingredients not normally found in homes and scientific instruments such as magnifying glasses, scalpels, and microscopes to assist students in completing science experiments at home. Because of potential safety concerns, teachers encouraged parents to supervise their children and ensure a safe environment for conducting scientific research – functions normally assumed by classroom teachers in traditional schools.

Student assessment was another area in which parents assumed a central role in their children's education. At all online schools, the practice of involving parents in unit and term testing was well established. Parents administered unit and term tests. Tests were sent to parents by e-mail. They were instructed to arrange testing period, monitor the test, correct the test, and return the test mark to their children's teacher. At MVS, parents were also called upon to review test results with their children to ascertain where they might have had difficulty and assist their children in communicating specific problems identified by their test scores to their teachers.

This notion of parental partnership was one aspect of online education that permeated all teachers' descriptions of online education. Teachers suggested that one of the objectives of online education was to seek new ways of partnering with parents. Bruce described the goal of establishing teacher-parent partnerships as central to the values of MVS:

> *Yes, that's core, that is core. It's the family. It's who we are. This school was set up to involve parents in the education of their kids. It wasn't set up to say, "We need you to do fund raising or whatever, and we need you to do correcting, and we need you otherwise,". No. Parents and other family members matter. Ask your older brother and sister for help with your mathematics; there's nothing wrong with this. We encourage [family involvement] in it.*

The centrality of parents as partners was echoed by Joan who stated that" *it seems to be that in online, if the student is working from the home, or even from the school, there has to be a key player there [parent]; otherwise it doesn't work.*" Denise also described the importance of parents as not only critical to monitoring student progress but also in their role as student motivators:

> *In the online environment, it is more essential than it is in the regular classroom, because in the online environment I feel that we are team-teaching with the parent. I have no ability to ensure that a student's on task. And therefore I need assistance from the student's end--namely, the parent or guardian--to ensure that the student is on task and not playing games and so on. Even highly motivated students will have times when they need extra motivation, and at a distance, it is very difficult for me to be that motivator.*

Teacher-Teacher Interactions

The nature of and differences in the working relationships that teachers had with their online colleagues commonly arose in the interviews. All teachers described how more "intense" and close their relationships were with their online colleagues than they had been with their previous classroom colleagues. Unlike traditional school settings where teachers taught in relative isolation from each other, online teachers described their online teaching experiences as "transparent," where teaching practices, interpersonal communications, and instructional activities took place in an online public space. Teachers from MVS who worked from the relative isolation of home offices also reported feeling closer professional relationships with colleagues than they encountered in traditional school settings. When asked to discuss this matter, the online teachers provided a number of reasons why this occurred. They suggested that a primary factor in their closer relationships was the ability to view and review their colleagues' online courses. The nature of the technological environment underpinning online education allowed teachers to "*visit and roam around their colleagues classrooms*" in ways that face-to-face teaching did not. Teachers could, if they wished, review course assignments, student marks, and e-mail communication between colleagues and students or parents. The opportunity to review the online courses of colleagues gave teachers a better understanding not only of what a student could be expected to accomplish in a particular week but also to seek ways to cooperate with colleagues to integrate curricula and course assignments.

Opportunities for interaction. Another aspect of online education, which all teachers commented on, was the freedom they felt to interact with other online teachers due to the absence of classroom supervisory responsibilities. For teachers, the opportunity to interact with colleagues when "necessary" rather than when "possible" was a liberating feeling. John's description was typical:

> *There's a lot of freedom because we are not confined to a clock as far as scheduling classes goes. So we're able to interact quite freely and spontaneously. And I think that it leads to a lighter atmosphere, or it has in this case anyway, in the sense that there's a camaraderie. There's also a sense that there's a teamwork at play, more so than feeling that this classroom is mine and mine alone, and nobody else is inputting or receiving benefit from it. Here there's far more a feeling of "This is us all together presenting this."*

At NVS, teachers taught from cubicles situated in an open office plan adjacent to other teachers. In some cases, teachers were located within a few feet of each other. One result of this physical proximity was teachers' ability to overhear their colleagues' telephone conversations with parents and students. According to NVS teachers, this loss of privacy was a minor issue when compared to the positive aspects of "listening in" to a conversation between a fellow teacher and a student or parent. The information picked up through listening to other teachers' conversations was considered an important source of information that could be used by teachers when attempting to form a "mental picture" of a child or family. The ability to "sense" who their students were was considered invaluable to teachers. Sensing or forming a mental picture of a child was the one educational task which teachers spoke about as being the most important yet difficult task which they faced.

The ability to overhear conversations also allowed teachers in office environments the opportunity to emotionally support fellow teachers when dealing with an disgruntled parent or unhappy child. As one teacher explained, overhearing conversations helped them offer support when it was needed.

In addition, physical proximity and the freedom to interact without the constant responsibilities of supervising a classroom allowed teachers to coordinate their responses to parents and students. The chance to share vital information concerning a student's progress or a parent's concerns produced a more consistent and coherent message from the online school. Joan explained the benefits of physical proximity:

> *See, that's one really nice thing, because in a classroom setting you deal with a student, and the only time you get to vent that with other teachers is if you go out on the Friday night to the local pub and you discuss those things. But in this environment you can hear if somebody's having some frustration; or they may get off the phone and have a certain frustration; or with e-mail, quite often we get the same e-mail from the same students and say, "Okay, how did you respond to this one?" so that we're kind of consistent, that we're coming back in a very consistent manner with how we're approaching things so that the*

> *parents aren't getting a nice answer from me and a horrible answer from Mary. It allows us to be really consistent in how we deal with our parents and our students. Even with a certain student who is not performing; all of a sudden you say, "Oh, how's this student doing in your class?" and get instant feedback that way.*

Denise also described how physical proximity had helped her get a better picture of a student and assisted her in responding to parental inquiries. She described the ease with which she could gather information about a student or family by simply raising her voice and asking her fellow teachers for information. She elaborated on this communication strategy in the following way:

> *One thing that's nice with the proximity is, you can check-and unless it's a real outstanding case in a classroom, I won't check with another teacher, but in this case I'll just holler, "Hey, have you had anything from Rebecca in a while?" And they'll all answer, "Yes, I just got something last week" or "No, she hasn't done anything in about two months." And then I can make a decision: Okay, it's not just my class. Let's take this-I'll phone, and if there's no action, then we'll take it to Andy, Ron, or whatever. But we do that, I think, a lot more than anybody in a regular classroom setting would just because of the proximity in that area, and just, "Hey, can you read this over for me? Can you read this e-mail? Does it sound—?" especially if you have to maybe discipline a student or something, or a parent gives you a letter and you have to respond to it: "Can you just read this and let me know what you think" So in that way, yes, definitely, I think the proximity is nice, for sure.*

Another aspect of working in close proximity to one's colleagues was the opportunity to engage in conversations at any time. Greg said "*the people who are here [in the office] can have immediate contact with you. You're not bound by timelines, you don't have to be in a class, so therefore you can take ten minutes out of your morning to talk. It's easy to talk to each other."*

Working relationships. Working in settings where teachers' interactions were not restricted by a teaching timetable or by physical isolation also produced closer working relationships at SVS. Carol, the local administrator, described how teachers had "bonded' during the first year the school had operated. She attributed the close working relationships to the physical environment in which SVS teachers worked and to the collective challenges faced by teachers in developing online courses and participating in the opening of a new school. Carol described her impressions of the close interactions and relationships among her teaching staff:

> *The differences when you look at a traditional classroom setting, you're in your classroom-at least in our school; we don't have team-teaching situations or shared classrooms; those don't exist. You're in your classroom, and that's sort of your domain; you're the king in there. And when you choose to come out and get help from a colleague, it happens in some departments more readily than in other others, and that's something that we just don't have happening enough in our school. We know we need to have more of that going on. So pulling all of these teachers into a online environment, we thought, This is going to be an interesting experiment here to see just what happened. How do we want to set them up to start with? Do we want to let them take the computers back to their own rooms and work in their own little domains, or do we want to set them up somewhere where they have to work together. How do we want to do that? So they probably figure we didn't have any sort of plan for any type of inservice with them or any type of training whatsoever, but there actually was a master plan there. And through the miracles of our network that never functions properly all the time, we could tell them that they needed to have their machine in there in order to work on the online program. And at that point they didn't know enough to know that you could put it anywhere in the building and it didn't matter. So they all started out working in one room and collaboration happened automatically. Now, I think part of it is that when you're on a sinking ship or you feel like you are, everyone cooperates to get the lifeboat down, and that's sort of where they were at, is the learning curve is so steep.*

Elsie echoed Carol's description of the close working relationships among SVS staff members. She concurred that the shared stress associated with beginning an online school while also developing course materials had brought the staff of closer together. She described how teachers from disparate subject areas had formed strong professional and personal relationships over the past year. In describing her relationship with colleagues Elsie said:

> *Oh, I think it is. It's very intimate. We all came through fire with this, and I guess when you look at the different personalities--Owen, for example--I probably wouldn't have spent very much time with him at all, or even have gotten to know him, with being in the different wings.*

> *The way the school's set up, there's an English wing and there's a science wing, and you'd come together for staff meetings, but I wouldn't have even necessarily known who he was. And now he's phoned home; he calls me at home if he has something. I call him and he calls me. It's much more of a friendship kind of thing than a colleague kind of thing.*

Elsie also observed how closer professional and personal relationships contributed to an enhanced willingness to assist colleagues through sharing Web sites, technological shortcuts, and multimedia resources found on the Internet. Bob noted similarly how online education had contributed to a more open sharing and collaborative environment than he had found while teaching in the classroom:

> *We're very, very open about our materials, most definitely. Like you say, I haven't been in a classroom formally, only in student teaching, but it seems like resources and lesson plans are treasured secrets. But maybe it's because of our proximity, the nature of the Web, just who we are, I don't know. But I know I can ask Jake for anything, and he's going to give it to me.*

Those teachers who worked from home also reported that they had encountered a greater willingness among by their colleagues to work collaboratively. George and Darren attributed closer working relationships to the many challenges associated with the "pioneering" of online education. Unlike other forms of education where practices had already been developed and substantial theory and research existed, online teachers felt as though they were undertaking a journey into the unknown where the success of the trip would be dependent upon the assistance and support of their colleagues. For all participants, this was a new experience.

Teacher-Student Interaction

Interviewed teachers reported dissatisfaction with the quality and quantity of interaction between themselves and students. While teachers spoke about the importance that interaction had on student motivation and therefore student learning, they characterized their interactions with students as rudimentary. Interactions, according to teachers, consisted predominately of e-mail interactions around the exchange of assignments, questions about a particular aspect of a lesson, and sending general e-mail messages to students about a portion of a lesson. In some cases, notably NVS, the use of the telephone to augment e-mail interaction occurred. However, interaction was restricted to inquiries about technological support or curricular concerns. Few teachers reported interactions involving discussions over the telephone about topics not related to school. Teachers noted that the they were perplexed as to how to initiate interactions with students to build relationships while also keeping pace with the amount of work involved in teaching online. Moreover, all teachers remarked on their lack of understanding concerning how best to "think about" interaction with students.

In discussing the importance of interaction and communication with students, teachers often described interaction in terms of the technology used to communicate with students such as e-mail, online chat, threaded discussions, and the telephone rather than in discussing the purpose of such interactions might have within the wider context of online education. Teachers described how technology had presented them with the ability to communicate; yet they still felt "distanced" from their students. They reported that the physical separation from students made the task of relationship-building more difficult. Each teacher reported struggling with feelings of "*disconnection*" from students and described how they were actively seeking new ways of reconnecting with "*their students*." The importance to teachers of establishing a "*connection*" with a student was exemplified when Tyler described how he felt when he had made a connection with a student while solving a mathematics problem. He compared the emotion he felt with an online student to similar experiences in the classroom when he was able to create a "*bond*." He said, "*the interaction is different, obviously [online]. There is a good, warm feeling of helping a student turn on the light, but it's a different type of interaction. I think the gratification is still there for both, depending which medium we are using--traditional or online.*"

Reactive interaction. While many teachers described their desire to get to know their students, all discussed their frustration at not knowing how best to engage in interactions that could lead to such relationships. They reflected on the time required to initiate interactions and the difficulty in making "relationship building" a priority when other equally pressing tasks awaited them. Mary described how she had felt overwhelmed after joining NVS with the many unfamiliar responsibilities of teaching online. Her response to feeling inundated with new tasks was to resort to a "reactive" mode of communication and to rarely initiate communication with her students but rely upon them to initiate interaction:

> *The type of interaction I have now as a teacher, I'm kind of a little embarrassed to say, is kind of a reaction right now. I'm in a reaction mode, because basically I haven't had a chance to contact students on my own except for one. I contacted all students once, and it was only by e-mail, to tell them individually where they were to be [in the course] and where I thought they should be. I was here for any help whatsoever whether they wanted to phone me or felt more comfortable e-mailing me, or calling me.*

Teachers in all four online schools echoed Mary's observation concerning her reactive mode of interaction. Teachers to some degree felt that much of their communication with students was reactive rather than proactive. Each teacher cited many reasons for this common absence of time to initiate communication and inadequate strategies for building online relationships. Teachers identified a lack of preparation and skills to extend interactions ranging from answering questions to engaging in more meaningful exchanges which could give teachers insights into the lives of students. Instead, teachers felt adrift without any clear signposts to guide them towards creating closer connections with students.

E-mail interaction. Online education can be distinguished from other forms of distance education by its reliance upon e-mail. All students had access to e-mail accounts. Teachers also accessed their own e-mail accounts over school networks when working in offices, while teachers working from home used dial-up connections. Students accessed their e-mail over dial-up connections provided by the school to all students.

Teachers generally began their workday by downloading their e-mail and spending the first few hours of each teaching day answering student inquiries. Students could expect to receive responses to their inquiries throughout the day. When students' questions were unclear, they could expect to receive an e-mail request from teachers asking for additional information about a problem. This use of e-mail, while an efficient way to manage interaction arising from students seeking clarification on curricular issues had drawbacks. Several teachers pointed out that e-mail interactions placed a significant onus upon a student to compose specific questions to teachers about the trouble they were having with a particular lesson or assignment. This often required students to understand what they did not understand, i.e., to diagnose their specific learning problems. Most teachers reported that students were able to ask specific questions concerning their problems while in some cases, greater efforts were required to assist students. At this point the asynchronous nature of e-mail became a hindrance to teaching and problem solving. When asked about the problems of students who could not ask pertinent questions concerning their learning difficulties, all online teachers reported turning to the telephone. Teachers reported when students were having more than normal difficulties or where it was more "efficient" to talk over a problem with a student, they relied upon the telephone.

The reliance upon e-mail as the primary means of communication in online education was partly due to the cost of alternative communication strategies. Only one of the four online schools in the study had access to a toll-free telephone number which students could use to contact teachers which or teachers could use to contact students or parents. In addition, some teachers felt that inasmuch as online education relied upon the Internet for the distribution of course materials and the exchange of student assignments, that it was "only natural" to rely upon same network to facilitate communication.

This reliance upon e-mail restricted interaction to text-based communication. Teachers reported that getting to know students through e-mail exchanges was difficult. According to the teachers, not all students possessed the writing skills necessary to fully express themselves through text-based communication. Students who were unable to type well quickly became frustrated writing long e-mail messages and therefore were disadvantaged through reliance upon text communication. Yet, in other cases, the use of e-mail by students to communicate with teachers created an environment where students were more willing to share their thoughts and feelings.

George described an incident where the use of e-mail had allowed him to get to know a student in ways that he suspected could not have occurred in a traditional schooling environment. He recounted how he often attempted to insert some leading questions when sending out his weekly science assignments. Leading questions such as "H*ow was your weekend? Did you watch a particular hockey game this weekend?*" were often opening gambits to engage students in an online conversation with the goal of encouraging students to share something of their lives with him:

> *I will often ask leading questions when I send out assignments, and so every time I send out an assignment, I will either talk about my weekend or comment on some event that has happened, and very often students will reply to that; they will tell me about their weekend because I ask them about theirs. And so I'm always surprised how much the students want to talk to teachers, because in the classroom, because it was a social environment, they did come to my desk. There was the group that liked to talk to me during the breaks. But I find that more students online want to talk to me as their teacher than in the classroom, and so there seems to be less of a barrier to talk to a teacher. In the same sense that you would talk to your friends about what you do this weekend, this student will tell you what they did this weekend. I try and be perceptive to comments that are made in messages that are sent to me. For example, if there is a student who is feeling neglected or possibly disciplined because of behavior in the school and they make a comment on that, I respond to that and ask*

> *them to talk about it--not in that way--but just make a response to it encouraging them to reply to that. So if they are essentially sending out a signal to me that this is either positive or negative, something that's happening in their world, to me that's a signal that they want to talk about it, and it's a conversation that we can have.*

When Carol used e-mail to answer student questions, to attach assignments or to engage in online discussions, she reported that she also witnessed students using e-mail to make sure she did exist and was taking an interest in their well-being and them in hers:

> *From the standpoint of what I get as feedback from the kids, they want to know I'm there. They want to know, if you don't get back to them within two days, how come? What's wrong? Are you sick? Where are you? I need help with this. It's been an hour. Where are you? It depends on the student, but they need that contact.*

Telephone interaction. When teachers wished to explain complex concepts or when a student required extensive assistance, they relied upon the telephone. At NVS, a toll-free number for students to call the school and for teachers to call students was established during the school's first year of operation. The absence of long-distance charges within the province resulted in teachers, students, and parents using the telephone to a greater extent than at MVS, SVS, or EVS. When entering NVS, I was immediately struck by how extensive the use of the telephone was in online education. One of the most powerful memories I have of online teachers at work was of visiting NVS for the first time when I observed teachers using hands-free headsets to talk to students while at the same time accessing student files on their computers, composing e-mail responses to students, or searching through textbooks or manuals to better answer problems posed by students.

The extensive use of the telephone by NVS teachers could best be described as telephone teaching. John encouraged students to use the telephone when they encountered problems. He suggested that the telephone allowed him to both better diagnose where students were experiencing difficulty but also allowed him to provide instruction in a more timely manner than with e-mail. He described his use of the telephone in the following terms:

> *Often I prefer students--whenever they have a question about how to do something--[to telephone me]. I prefer when students have problems to phone because students often don't know why they're having difficulty, and if they did, they might not be able to solve their own problem. So by using the telephone, I'm able to narrow down much more quickly by asking a series of questions what their main problem is. Often it's just a few key points or maybe just one key point that they need to address, and often that key point could be some required knowledge that they should have obtained in previous years. And then it's very difficult to know what that is because that kind of field is so vast, so by asking a series of questions, I'm able to narrow it down and then hone in right on what they're having problems with. And so I find it much quicker; I think it's a lot less frustrating for students. And it's also an additional means of communicating. Currently, their instruction is all either in print or on the web in a format that they have to read. So when they've encountered a problem based on reading to learn possibly adding a voice dimension or an audio dimension may give a student another chance and another way of learning.*

According to Joan, an additional benefit of the telephone was its "immediacy". Students experiencing problems could immediately contact teachers for advice instead of waiting for teachers to answer e-mail questions. Teachers at NVS commented upon the benefits of students asking questions when they encountered problems. They described how important it was to have students call when having a problem and remarked how the telephone allowed them to capitalize upon the "teachable moment." They recalled how students and their parents praised their availability to students when their children encountered curricular problems.

However, telephone usage was not without its problems. In homes where students had access to only one telephone line, students could not speak to teachers and connect to the Internet at the same time. Teachers and students were required to choose between whether it was more beneficial to engage in a conversation or to view course materials and communicate using other communication technologies such as online chat or shared white-boards. Teachers reported wishing that one day they could conference together where both student and teacher could communicate by phone while each could share an online document. While NVS and MVS were using WebCT in some courses that incorporated the use of white boarding capabilities, true interactive conferencing was limited, according to NVS teachers, unless students could access two phone lines.

Students in school settings had even less access to telephones than did students at home, often resulting in teachers relying on e-mail to communicate with site-based students. In other cases, students wishing to use the telephone to communicate with their teachers faced competition from siblings or parents wishing to use the family's single phone line. Elsie said that she had tried to help students who could not readily use the telephone to ask questions by developing a database of resources that students could turn to when they encountered a problem:

> *Some of these kids only have the one phone line in the house, and I know there's competition with the computer, or the older sister wants to be on the phone all night when some of these guys are trying to do their assignments and things. So as much as I could, I tried to make a resource database.*

Yet, for all teachers, the benefits of using telephone technology to enhance online education was significant. Teachers reported gaining greater understanding of who their students were as people by listening to background sounds while talking to students. Greg described how the telephone had allowed him to "hear" more than just words:

> *The tone of a person's voice, understand how they're feeling, if they're upset or, happy are available on the telephone. Sometimes you can't always get that on a text chat. And a greater understanding, so that will mean when you hang up the phone you're both fairly clear on what the point of the conversation was, whereas sometimes on a text chat you're left wondering, Did they understand what I was saying?*

Using telephone as a "window" into a student's world was considered by all teachers as one of its most powerful uses. Teachers often reported hearing the sounds of dogs, other siblings, or parents during conversations with students. Such sounds provided an opportunity for teachers to begin a conversation about where students lived and what their lives were like. The telephone provided teachers with the opportunity to build relationships with students in ways that e-mail could not achieve. As teachers pointed out, the telephone allowed teachers and students to engage in the normal give-and-take of conversations and provided opportunities to quickly elaborate ideas or clarify meanings without the lag inherent in using e-mail.

Chat interaction. "Chat" in this section is defined as synchronous text-based interaction mediated by computer technology. Teachers described the process of building a mental picture of students in a regular classroom as being based upon a progression of interactions with students, both in and out of the classroom. Through observing students' interactions with peers, their clothes, personal habits, and behaviors, teachers often gained an understanding of "the persons" whom they were teaching. All teachers described the notion of coming to know the students in their traditional classes as beginning with a combination of many sensory inputs. However, in online education environments, teachers felt constrained from forming a mental picture of a student. They lacked the equivalent data to generate a compete picture. Consequently, they often resorted to attempting to "*read between the lines*" of e-mails, online chats, observing students at callbacks, or possibly engaging in telephone conversations with students to form a better understanding of them.

When asked to identify the most important interactive tool for gaining an understanding of students, most teachers selected online chat sessions which allowed teachers and students to converse and get to know each other in an informal setting.

According to George, the use of synchronous chats gave teachers an opportunity to know their students in ways that may not have been possible in a face-to-face setting where appearance or social skills could have interfered with social communication. George recalled how he had corresponded with a student through e-mail and participated in regular chat sessions exchanging views about the nature of the world and current events. Their conversations had progressed from a simple exchange of views to one where they had formed an "online relationship." Yet, as he observed, they had not physically met until a "callback" session was held. George recalled that rather than meeting the dynamic outgoing correspondent from his previous communications, he was struck by the social awkwardness of the correspondent:

> *And so a student who may be not the kind of person that would draw friends can have a terrific sense of humor, can have very good conversational skills in text, and yet in conversation stumble over words. And so I think of a young man who I've been teaching now for three years who is a very interesting person. I suppose we share a lot of the same interests, and he has a very active mind. And yet those same qualities are not the first things that you see when you meet him face-to-face. You see a very nervous person, a person who has a bad complexion, all these physical things that we put labels onto. These certain students stand out in my mind because I think, I'm glad I got to know you by e-mail first, because I know you as a companion, as a friend, as a personal interest. I got to know you for your positive qualities first rather than from [physical attributes].*

The opportunity to use chat to communicate provided both George and his student with the "freedom" to share ideas free from the prejudices of position and physical appearance. The use of chat also allowed ideas to be communicated in real time without the filtering of lengthy preparation of asynchronous e-mail. Chat provided students with an avenue through which they could establish a connection with another person in ways that other asynchronous communication channels could not, according to George. The use of synchronous chats allowed them to engage in informal communication with students which was often a precursor to more in-depth discussion which took place through e-mail. Joan and Darren likened the use of chat to the impromptu "hallway" conversations they engaged in while teaching in the classroom and observed that the use of synchronous chats brought them and their students closer together. The "informality" and relationship-building aspects of chat were reinforced by invitations to chat outside normal school hours.

Teachers at NVS and MVS used First Class software to manage their e-mail. This software had the option of sending a message to a particular person to invite them for a chat. When the message is sent, a bell or a flag appears on the recipient's screen notifying that a particular person wished to chat. Teachers at NVS and MVS reported how they would often receive invitations to chat at odd hours. They observed that students expressed a greater sense of connection with their teachers when chatting with them during evenings or weekends and that generally students were substantially more open and forthcoming about themselves outside school hours.

In addition to the use of chat as a relationship-building tool, teachers reported trying to use chat functions for tutorial purposes. Danielle, Bryan, and John described their attempts at setting a regular time period--a few times a week--to be available to answer student inquiries. Teachers who had tried to use chats to provide tutorial support reported mixed success. They observed that students were reluctant to ask questions in an environment where others could see their questions, while in other cases the questions asked by students were often specific to a particular student's problem and consequently other students lost interest in participating in the chat session. Teachers felt that students were much more interested in talking about personal topics, such as asking about current events and seeking teachers' opinions about personal preferences for music or clothes than engaging in chat about curricular concerns.

Student-Student Interaction

All teachers reported how important they felt interaction was between online students especially where students were studying online from home and where students could be socially isolated due to their enrollment in online education. In describing their responsibility to facilitate or manage student-student interactions, teachers reported wrestling with the questions concerning what role they should play in requiring student-student interaction. For a minority of teachers, student-student interaction was not considered to be an important component of online learning because online education was a self-learning environment involving independent study. However, for most of the teachers, student-student interaction was considered vital to successful online education. This was especially true for teachers who felt that knowledge was socially, rather than individually, constructed. Still other teachers were unsure what their limits of responsibility were in facilitating student-student interaction. This was a key issue in online schools where parents were reluctant to support such interaction. Some teachers reported families who had chosen online education as one means of limiting their children's interaction with others. Also, varying opinions were obtained among teachers about how to facilitate student-student interaction and what such activities might look like. While opinions varied, all teachers distinguished between formal and informal student-student interactions.

Most teachers defined "formal interactions" as those in which students communicated and collaborated on specific curricular assignments or lessons. Informal student-student interaction was defined as personal e-mail, online chat sessions, and other interactions that had no direct "educational" benefit.

Teachers who supported the notion that knowledge creation was not exclusively an individual activity reported a great deal of frustration at how best to create a social learning environment. Darren concluded that his attempts at planning group projects were disappointing and described his initial attempts at facilitating and organizing group learning online in these words:

> *It was a real learning experience from my end and, I'm sure, from the kids. I've done it [group projects] on a number of occasions, and each time I say I'm going to do it differently. Initially, the idea was I was going to break up students into groups of five or six, trying to appoint one person as a group leader in the sense that somebody needed to organize group activities unlike a traditional classroom where there is always a teacher who can say, "Okay, we're going to work in our groups, go to different corners and then work together." When you're online, someone needs to coordinate a meeting time, which I can do to a degree, but if you're monitoring a large number of groups, the groups need to take some of that [responsibility] onto themselves. I've always found that having a group leader to set up meeting times was very useful. Very much like a traditional classroom, you've got people who are very gung-ho, and you've got some students that will do very little in the group and are more content with letting others take it and run with it. Yes, it's been an interesting experience just learning as I go what's going to work and what isn't going to work.*

Darren went on to identify some of the management issues which arose during his first attempt to have students work together online:

> *The other issue that we ran across is, if you wanted one completed project you had kids from all over the province, for example, contributing bits and pieces, somebody had to put it all together and combine all the components and put a package together that was presentable. Which was a big job in and of itself. So I'd try different things. That person [the project manager], rather than doing far more than anybody else, used researchers to gather information. They gathered all the information for their components. They submitted it to a project manager, who took the work, collated it, put it all together, and developed the final end-product. That was their role. Yet you ran into cases where students were frustrated because you'd send messages to a group member, and the work just wasn't getting done, or not responding to a message, and then they get frustrated. You have to be careful because you're not there to control it, and if they're sending messages back and forth—-. We've had a few flaming incidents where kids would get frustrated and put their thoughts on a message and send it off, and you're not in the classroom to monitor these kinds of things.*

Among the issues which Darren raised concerning student-student interaction was that of defining the "boundaries" of teacher responsibilities for interaction. At what point should teachers "take over" and bailout dysfunctional groups? Should teachers let student groups work out their problems or should teachers intervene? For Darren the resolution to the dilemma of setting boundaries rested in professional decision-making similar to the decisions he faced in the classroom. As he observed, you cannot just bring students in to a classroom, sit them down, and have them work out their problems. Online education is different.

In some cases where courses were self-paced and students were working at different paces and places, the requirement for students to collaborate on projects was made more difficult. This was a particular issue at NVS where most online courses were created to be self-paced. Bob described the problems of initiating student-student collaboration in a self-paced environment in this way:

> *It's a management concern. It's just an I-don't-know-how-to-do-it concern, I don't know what technology's out there that would enable me to do that. It's also a thing that we talked about yesterday regarding discussion and bulletin-boarding. Rarely do I have two students that are at the same place at the same time, unless they're in a classroom [taking online courses from a computer lab], in which case they're free to collaborate anyway because they have no bounds or boundaries. But we have kids that are on page 57 and kids that are on Day 1 and every day in between, and honestly, the chances of hitting two at the same time is tough.*

Another issue raised by teachers concerning group and student-student interaction was how to assess such interactions. Teachers suggested that if interaction required effort by students then it should be graded as a required component of an online course. After all, as one teacher pointed out, when she was teaching in a classroom she had always included a participation mark as a portion of a student's final grade. If students were to be "rewarded" for interactions then should students not be penalized if they chose to forego formal course-related interactions? Finally, teachers asked themselves whether they had a responsibility to respect students who wished to work alone. All teachers observed that they were still trying to grapple with the subtle but important ethical issues concerning interaction and the unique nature of online education where acceptable practices did not yet exist.

Orientation/Callbacks

Interaction in online education is not restricted to online interactions. Teachers, students, and parents attend face-to-face meetings generally referred to as "callbacks." The term "callback" is used throughout the K-12 online community to describe all face-to-face meetings organized by online schools. The term "callback" is also used by teachers and online schools to describe the general orientation and first group meetings which parents and students attend.

Callback purposes. Teachers reported that the organization of parent meetings or callbacks across the province have been attempts by online schools to allow parents and students to ask questions about the move to an online learning environment and to address any concerns that families may have about online education. All teachers described callbacks as an opportunity to "*put a face with a name*" and to begin the process of "*getting to know*" students and their families.

Another commonly stated purpose of callbacks is to provide technological support and initial training to families on how to operate the computers supplied by the school. During callbacks, students were provided with an orientation to the most important aspects of how to use the computers to connect to the Internet to access their e-mail, and the school's course materials.

Denise described her first callback experience:

> *It's a challenge, trying to figure out how to do an orientation; that's a huge one. At the start of the year we have an orientation where everybody is supposed to come. The first one is an orientation, and you have people there that are very computer-literate and just basically want to meet their new teachers. We have people there that don't even know how to use a mouse, don't even know how to double click.*

Another problem identified by NVS teachers concerning their initial experiences with callbacks was the lack of a shared sense among parents, students, and teachers concerning how a callback should be organized. Denise explained how inexperience on the part of her school had resulted in problems for parents and teachers:

> *Then once they get there, it's supposed to be drop-in, but they weren't told it's drop-in, so we stay nine till noon, and everyone gets there at nine when, in reality, they could come at ten, ten-thirty, eleven; it would make no difference. But meanwhile you get a massive influx of people at nine, and then they're all sitting there waiting. And it's not -- take a number; it's just first come, first served. There's a lot of butting, and there's a lot of people that don't even-I don't even know if they notice, or they're just being rude, and they'll just go right in front of somebody else that's been waiting for half an hour. And as a teacher, getting into it; I just look at my paper, and I pretend I'm marking. What can I do? I can't just all of a sudden-that's not my job, I don't think; that's not my job. That's an organizational problem.*

However, Bob described his first callback experience as generally more positive:

> *I think orientation and callback sessions are alike, everybody uses the same terms. The orientation sessions were two days. It was a basic "meet your teacher for half an hour sort of thing," then let's get into the technology and the tools, how you use them to do your schoolwork. So in some cases they went really well; in other cases they went horribly. It was partially dependent on the resources that were available at the institution we did it at. Where we had a computer lab available, like we did at NAIT [Northern Alberta Institute of Technology], it was fantastic! Every student had a computer; we could say, "Okay, open up ClarisWorks." They all could actually do it hands-on. But when we went down to, say, Calgary and we had 45 kids and 45 parents in a stuffy room at the beginning of September, with one laptop projecting to a screen for two days, animosity gets high fast. Some of these people are traveling four hours, five hours, spending two nights in a hotel, paying for all their meals.*

MVS and EVS had been in operation longer than had NVS and had, according to teachers, improved their callback/orientation processes. Over the preceding four years, according to George and Bruce, the online school had generally refined the orientation process for parents and students. Rather than attempting to mix technical training with opportunities for parents and students to meet their teachers, MVS administrators had decided to divide the tasks of providing technological training with an occasion for teachers to meet students and families. During callbacks, parents, students, and teachers were encouraged to get to know each other, and teachers were expected to discuss with parents and students their expectations for courses.

Home visits. Technological training was provided during home visits at MVS and EVS. Both schools attempted to organize teacher visits to all families before the middle of September in order to drop off the school's computer and to provide any necessary technology training to students and their families. According to all MVS and EVS teachers, they would also drop off any bulk material such as textbooks while visiting families. George and Bruce stated that during the initial home visitation teachers would explain the operation of the computer, configure the dialup connection to the local internet provider, and answer any questions which families or students had regarding the school's expectations and responsibilities of online education. George described a typical home visit:

> *When we walk into that house, if it's one of our computers, they're usually finding it easy to set up. If it's their own computer, we usually have to do a little bit of tech support, to use that term. So you spend time doing that, and you make sure their computer is fine, it's operating well. Then you do the online tour. And I know when I've gone out to houses, first of all I make sure it's all working and that I bring the student and the guardian together, and I say, "Okay, this icon is the school. Log onto the school here. And what I'd like you to do is create some folders here and put your work here. You're going to create a folder for your assignments that you will send back." I do that; that's how I do my home visits. So I guess it's almost a fifty-fifty split. I feel fairly comfortable when I leave the house that the students know how to upload, download, where the school is, and the philosophy of the school in that regard, and the parents have an idea of what their responsibility is. I hope we all do that, and I think we do. But really, when I leave, they have to get involved in it. They actually have to sit down and do it, and then they'll learn it, because I can explain it till I'm blue in the face, but unless they do it, they're not going to get it.*

George described an additional benefit to families who might be apprehensive about online education. He described how home visits were important in establishing trust and how initial visits resulted in students feeling greater comfort in contacting him at school:

> *especially for the parents who are apprehensive a lot of times. It's funny. Tyler's done the majority of the home visits out of the three of us. Guess who gets the majority of the tech calls from parents? Tyler. But if I've done a home visit and the parents are having problems, they call me. So they can put a face to your name, and they feel that you're their little helper.*

Another benefit of home visits was the opportunity to get to know students and their parents informally while also holding impromptu parent-teacher conferences. Greg described his callback experiences as having more to do with building a relationship with students and their families than with explaining the operation of a computer:

> *Callbacks are a new thing to me this year. I really don't use them in any way except to meet the parents and meet the students. There are activities planned at callbacks, but really, I just run an activity; it's not an activity that directly benefits what I do. I'll either run the gym for phys. ed. activities, or the last callback I'm going to probably cook. So in that regard I don't do a whole lot, as some other teachers who do technology sessions and mathematics-help sessions and things like that. I see the value in those in getting in some of the kids, and the kids being able to put a face to your name and understand a little bit about you.*

NVS, EVS, and MVS all held callbacks on a regional basis to provide orientation to their students. SVS did not hold callbacks. SVS only accepted students from within its local school boundaries, and so the practice of organizing callbacks on a regional basis was not required.

Online Assessment Strategies

Teachers discussed how teaching online had presented them with unfamiliar challenges involving what to assess and how to assess student learning online. Of the many challenges which separation between student and teacher presented to teachers, chief among them was how to develop an assessment strategy which would sufficiently reflect and measure student learning and student responsibility for learning. This especially applied because of the role of teacher was less one where information was transferred to one where the teacher was a "guide on the side." Teachers described how they struggled with notions of what type of assignment would best demonstrate acquisition of knowledge and skills.

Submission of mathematics assignments. Mathematics teachers reported being particularly challenged by how to design online assignments. Unlike English, social studies, and junior high science courses, the study of mathematics required teachers and students to render mathematical symbols through the use of equation editors. Although each student and teacher computer came pre-loaded with a mathematics text editor, the time required to render mathematical symbols in a digital environment was two or three times as long. As Denise explained,

> *A kid should not be penalized-for instance, you have to really-those math-type programs and that sort of thing, they're hard to work; they take a lot of effort and a lot of learning, and I don't think a student should get it wrong just because they don't know the program.... But then when it comes to the actual doing it, so far the best thing I've found is paper and pen and pencil.*

John echoed the difficulty that mathematics teachers had in planning assessment:

> *It's not necessarily as difficult as it is time-consuming. We have Equation Editors which I feel are quite optimum. But when you have a pencil and paper in hand, it would be much quicker, and doing the same thing. In my estimation-not based on any study, but just personal experience-is roughly that it will take two to three times as long to place your mathematical notation on a computer as it would on paper.*

Due to the difficulty of rendering mathematical symbols digitally, rather than relying upon paper and pencil rendering of mathematical computations, all online mathematics teachers reported shortening of assignments and making extensive use of examples from the textbook rather than developing new online mathematical material. The prevailing practice entailed online teachers developing an assignment which would present an introduction to the new skills to be learned, direct students to review the pertinent section from the textbook, practice the new skill by completing a number of questions from the textbook (using pencil and paper), and check their success based on the answers and examples from the textbook. Finally, mathematics teachers required students to complete an assignment containing a number of questions to be rendered digitally using mathematics editors which would be submitted for assessment. Online mathematics teachers would correct the assignment checking for errors and miscomprehension, record the student's grade and then return the assignment by e-mail. Of course, online teachers shared the equal difficulty of rendering mathematical symbols when providing explanations to incorrect student answers.

Yet, in at least one case, the difficulty of marking student assignments was lessened through the use of style sheets. Bruce described how when sending out a mathematics assignment he would insert a spreadsheet into the assignment in which students would record their final answers. After receiving a student's assignment with answers recorded on a spreadsheet, he would copy and paste answers on a master spreadsheet. The spreadsheet would automatically identify the correct answers and record a final grade at the bottom of the page. As Bruce pointed out, this greatly reduced the time that his marking required.

In other cases, because of the complexity involved in digitally rendering mathematical symbols required to answer questions and the desire by online teachers to review the step-by-step process by which answers were derived, some online teachers notably in areas such as Mathematics and Physics 30, required students to submit written work on paper. Assignments were submitted by facsimile machine or through the postal service. Not only would the paper answers show how students had worked through a question but they also allowed teachers to physically "markup" the assignment and return it to the students. Bob described the problems involved in faxing assignments to and from him: "*The problem with the fax machine, we found, was if you mark in red ink and send it back, it all looks black.*" In response to this problem Bob initiated a submission protocol. Bob described the NVS solution to this problem: "*What we often do is split the page that the kid's faxing, split the page in half, student work on the left line, teacher comments on the right, and that enables the students to separate their work from our work.*" This was one solution to the confusion of one-color faxing technology. It also addressed the difficulty that online mathematics and physics faced when attempting to diagnose computational problems without being able to review the procedures which students followed in attempting to answer problems. Moreover, in advanced mathematics teachers reported that it was impossible to know, without seeing the complete answer, which procedure many of the students were using to solve problems. For mathematics teachers in this study, the use of alternative technologies to the Internet helped them bridge the separation that they felt between students and themselves.

Lack of Ongoing Assessment

Online teachers discussed the challenges inherent in the distance they felt from students and the difficulties they had in using ongoing, informal assessment as a teaching tool. Denise explained that being separated from a student resulted in her inability to informally review a student's progress and consequently the complexity involved in attempting to provide support to students as she had routinely done in face-to-face teaching:

> *Because in a classroom you can also say, "Okay, let's go over [the assignment] Matthew, write number one on the board. You write number two; you write number three," and they all mark their own; or else "Pass your paper back," and you mark it in class, and it takes five minutes; (a) they've got feedback, (b) they went over it and they see how it's supposed to be; (b) now they know what they've got as a mark, so it helps them in that way.*

Unfortunately, in a distributed learning environment Denise felt she could not as closely monitor, assess, and provide feedback to students. Other online teachers also reported struggling with the inability to look over students' shoulders to quickly review their written work, provide encouragement when needed, motivate students with a touch on the shoulder when required, or provide reinforcement by the impromptu tutorial (re-teach) activities when necessary. While an obvious solution might have been to require students to submit either partially completed or more frequent but smaller assignments, enabling teachers to provide ongoing interaction, online teachers were reluctant to initiate this because of the time and effort it required to review and correct online assignments.

Unlike the classroom experience where students and teachers "marched lockstep" through teaching-learning activities, online students--except for MVS and to some extent EVS students--studied independently at their own pace. One result of self-paced online courses, as reported by teachers, was the multifaceted task of correcting individual student assignments rather than "batch" marking sets of class assignments. Consequently, teachers were receiving individual assignments from students throughout the course requiring them to individually assess assignments rather than engage in "batch marking." Denise described the difference in her assessment practices:

> *They're all basically at the same spot, so, yes, you're marking the same amount of assignments or whatever, 40 assignments, but they're all the same A-bing-bat-a-boom-a-bing-bat-a-boom-a-bing-bat-a-boom. You get your rhythm, and you get going on them. It's very easy to mark.*

However, this quick rhythm inherent in batch-marking was absent from online. To mark individual online assignments, teachers would first locate the student's electronic file, open the file, locate the answer rubric and open it, review the original assignment, and begin correcting the assignment while attempting to insert comments or explanations within the text of the assignment. After correcting the assignment, teachers would save the student's original file and the corrected file, and return the marked file to the student with a copy to the parents of the student. In self-paced courses teachers would repeat this process over and over. And in each case, teachers reported the need to shift their "mindset" or focus to the student, his or her history within the course, the particular assignment, and the specific scoring rubric. Not surprisingly, teachers reported that the demands of online assessment were a constant source of professional stress.

Providing Assessment Feedback

While mathematics presented specific challenges about how to render mathematical symbols in a digital assignment, other courses also presented particular problems. One of the subject areas in which teachers described specific challenges was in the assessment of creative writing. Darren described the challenge he had found concerning his inability to sit down and discuss with students their progress and strengths and weaknesses on a specific piece of writing. For him this was one of the chief detriments to his online teaching. Darren wished to find a way to provide students with feedback on their initial written drafts that mimicked his previous practice from the classroom. After much experimentation, Darren had devised a solution that went some way towards addressing his problem. He used compressed voice files which allowed him to record a 5-minute monologue that provided feedback to students. Because of new compression software and freely available audio playback software, students could download the audio file and listen to their teacher discuss their assignments. Darren's written e-mail reply and the student's edited assignment would complement the audio feedback. All this could occur in a few minutes of download time--even in low bandwidth locations. As he stated,

> *I had found in a traditional setting-and writing is probably the best example of this--is to have a student evaluate their writing, as opposed to writing all over a sheet on my own and then coming and giving it to the student. I always found it much more effective to bring a student up and work through it with them and discuss, and they would say, "This is what I was trying to get across," and "Okay, how can we get that down to words?" and work with them. What I was trying to emulate at least one way was to pretend that the student was there with me as I was reading their work online, and I was reading the work, I would talk as if a student was there and record it as a sound file. And they'd talk for five, six, eight, ten minutes, and it's incredible. In an eight-minute conversation, I can say that the equivalent would be four, five, six pages of writing.*

The use of compressed voice files to provide feedback demonstrated the potential for new technologies to continually revolutionize existing online practices with more imaginative practices. Darren described the benefits of audio files:

> *If they're having a problem with-or don't understand [an assignment] I can give an explanation on something, especially if it's involved rather than a quick answer which you could type out. Depending on the nature of the question, if you can see where they're getting off track and you want to be very sure and explain to them, if they're going off on a tangent or you can perceive where they may continue to go off on a tangent, if you want to correct that. So I can record a voice file and sort of warn them where they're going off track or how to stay focused, hopefully resolve the issue. And the advantage of having a voice file is that the student has it; they can always come back to it and play it again at any time, and so they have a permanent record of it.*

The use of audio files was one solution to the isolation which teachers felt from students. It also allowed for greater interaction between student and teacher.

Monitoring Assignments

Every online teacher reported an unease with the issue of trust and an inability to ensure that the completed assignments received from students were, in fact, completed by students. Their concern was partially fueled by other educators who often remarked that online students were privileged through the lack of direct teacher supervision of the learning and testing environment. Online teachers relied upon parents to supervise the administration of examinations and in some cases (EVS, MVS) parents were also enlisted to mark the children's examinations and submit the final grade mark to the online teacher.

When discussing the security of student assignments, teachers often discussed the *potential* for cheating rather than describing actual incidents. The issue of trust was further complicated by a need to define what was and was not acceptable assistance by parents. This was illustrated by the difficulty that teachers had in determining whether the assignment accurately reflected a student's ability. For example, teachers questioned the possibility that parents might inadvertently provide unacceptable assistance to students when supervising testing thereby allowing a student additional time to complete a test, allowing multiple attempts at the examination, or answering questions with unintentional leading answers that could bias the assessment process. As John explained, the issue of trust and cheating was complex:

> *I guess, a large range of levels of cheating, let's say, ranging from using the textbook when they shouldn't be to copying answers from somebody else. In mathematics when they use a textbook and they shouldn't be, the problem's not serious because those questions are not from the textbook, and so they won't find answers in it. And so I'm not as concerned about that, though I prefer that they don't, but that's not a major cheating issue, as major as other issues. When they are transferring answers directly from student to student, then it becomes much more of a serious issue. And then there's the additional aspect*

> *that these tests are supervised by a parent or guardian, and the parent or guardian may be assisting in a way that I would not approve of, and I'm not able to identify that.*

While these were obvious concerns to online teachers, the larger issue was what assurance teachers could have that students had learned the content, and by extension, the accuracy of a student's grade on an assignment, unit test, or exam in an environment where students and teachers were physically separated.

Each online school had wrestled with how to address these issues of trust. In response, a number of policies and procedures had been adopted by online schools in an attempt to address teacher and administrator concerns. In response to the possibility that student assignments were not accurately assessing student learning, MVS and EVS conferred with parents and had begun planning to move to four formal face-to-face testing periods throughout the year. These testing periods would include the administration of a mid-term and final examination. Examinations would be written on a regional basis and supervised by school staff. Final grades would combine both online assignments and formal examinations. Teachers hoped that, through the addition of face-to-face testing, that teachers, parents and students could have greater confidence that student grades were truly reflective of student learning.

The NVS decision to tackle the issue of trust and student assessment which differed in two ways from that used by MVS and EVS. First, in response to the concerns of testing online, NVS in partnership with Joan undertook to develop an online testing program that would begin to address online testing security. The software called Examinator® was a product that enabled teachers to post examinations, to ensure that students could only access the examination at particular times, password protect the examination, time the availability of the examination, and track student movement throughout. Students at NVS would contact teachers and request a password to write a particular examination, then log on at a specific time often of their own choice and write the examination. When finished, the examination file would be sent to the specific course teacher for grading when automatic grading was not possible.

Second, NVS had initiated a policy whereby final grades would be based less upon ongoing online assignments and more towards online examinations. Moreover, students who scored 40% or less on a final face-to-face examination would have the mark recorded as a final grade. Teachers hoped that this policy would ensure that those students who had received inappropriate assistance during the school term would not benefit from such support. Moreover, this policy would address a concern expressed by traditional school educators who had questioned the lack of "rigor" in online education. By weighting final examinations towards greater reliance upon face-to-face testing, the concerns of critics would be addressed.

Recent Developments

In recent (late 1999) follow-up conversations with teachers, all reported still feeling challenged by the notion of "interaction" and its purpose within online education. In elaborating on their uncertainty, teachers suggested that their established notions of educational practice continued to hinder their understanding of interaction. Yet, teachers did describe a number of recent changes to practices concerning interaction between teachers, students, colleagues, and parents.

Recent conversations with teachers suggested that there has been little substantive change in the nature of teacher-parent interactions. Parents of online school students continue to express interest in their children's education. Teachers continue to compare and comment favorably on their meaningful exchanges with online parents based upon parental knowledge and understanding of the education process than their experiences with parents while teaching in the classroom. Teachers also perceived that continued recognition by both parents and teachers of the importance of "partnership" has continued to strengthen the search by teachers to "*bring parents into the online school.*" To this end, all schools had developed policies concerning timely responses to telephone or e-mail messages from parents or students. At MVS, the policy required that inquiries be answered during the school day if possible, or within 24 hours of their receipt where inquiries demanded detailed responses. NVS had adopted a similar policy and had installed a voice-mail system to allow both students and parents to easily contact teachers by leaving voice messages. All teachers saw timely responses to inquiries as a vital component of teacher-parent interaction and by extension to the notion of "partnering." Another aspect of the move to adopt policies concerning response times was to strengthen the service orientation of online education. As discussed in Chapter 8, online schools were increasingly adopting marketing plans and service targets in response to the competitive environment for online education.

Teachers also described their continuing efforts to help parents support their children's education. Teachers have continued to develop course outlines to assist parents in monitoring their children's pace and progress throughout online courses. Enhanced descriptions for assignments and more fully developed online courses have provided parents with additional insights into how best to help their children, according to the teachers.

Due to widespread parental recognition that peer group interaction is a vital aspect of schooling, parents at MVS had begun initiating face-to-face events for students. Teachers commented on recent efforts of parents to organize "sport nights" or other group activities for children. These were usually organized on a regional basis where a group of parents may rent a school gym for an evening. MVS teachers also acknowledged the importance of face-to-face interactions and had begun to organize a ski trip for students. The recognition of the shared nature of providing opportunities for student-student interaction was summed up by Bruce in a follow-up conversation in this manner:

> *The one thing that has historically been the responsibility of the school system is interaction. Schools will say, "That's what we do. We provide interaction." And I thought about this one for a long time in determining*

> *what this online education was all about. That is a requirement, or was a requirement 35, 40 years ago when I was a kid. We lived on a farm; we spoke Ukrainian. There was my mom; there was my dad and my brothers and sisters. That was the only interaction we had. To go to town was a big deal. Today these kids come home; they're chatting with people around the world on the Internet; they're playing hockey; they're playing [community] soccer; they're into piano lessons. I don't believe schools have kept pace with [the notion that, that the source of interaction is what happens in those four walls.*

Teacher-teacher interactions are also undergoing subtle but important changes. Teachers reported that they continue to work closely with school colleagues, but have also begun to initiate interactions with teachers from other online schools across Alberta. For Darren, Joan, and John, participation in the province-wide content development teams organized by the Alberta Online Consortium had begun to break down school boundaries and had helped to begin the creation of a "community of online teachers." Two of the chief benefits of such collaboration were the exchanging of insights into their professional practices and sharing viewpoints with other teachers about teaching online.

Convergence of Interactions

Perhaps the biggest change in term of interaction has been the continuing move towards "interaction convergence" within online education. All teachers described the emerging practice of merging online teaching and learning with increasing opportunities for face-to-face interactions with students. At SVS, teachers had begun encouraging students who were experiencing curricular problems to visit the online school offices for one-on-one assistance. Teachers reported many benefits to tutoring students within a lab situation where both student and teacher could discuss problems together.

Carol and Elsie outlined a plan at SVS where students who were unsuccessful at studying independently were being invited to spend a portion of each school day in the computer lab adjacent to the online school offices so that teachers can monitor their on-task behavior and offer assistance when necessary. Elsie described the arrangement as "*online education within a school environment.*"

At MVS, recent renovations have expanded the school offices to accommodate additional space for meeting rooms. According to Bruce and Darren, one purpose for expanding the meeting rooms was to facilitate students and teachers meeting for tutorial support.

The combination of face-to-face and online learning had always been a vital component at EVS. As described in Chapters 4 and 5, Greg and Tyler had consistently offered face-to-face learning support to students from the computer lab adjacent to their offices since both started teaching at EVS.

NVS has also begun to offer face-to-face tutorial support to students. Over the summer of 1999, it undertook to incorporate one of the remaining regional distance education consortia into its operations. This acquisition of the consortium has allowed NVS to offer site-based support to students on a regional basis. NVS also intends to renovate its offices with plans for additional meeting rooms to facilitate greater face-to-face support for students.

All teachers reported that, with the first phase of their courses developed, they were increasingly concentrating on moving from a "reactive" to a "more proactive" orientation with their students. At NVS and SVS, where most teachers had entered their second year of online teaching, they described how they were concentrating on trying to initiate interactions with students. In addition, online teachers revealed that their focus was now upon how to enhance their courses through using more information from the World Wide Web (WWW) and inserting greater amounts of freely available multimedia objects. Teachers at MVS and NVS were beginning to engage in the development of multimedia content. John noted how he was using sound files and interactive files to provide students with online tutorials to explain mathematics through sequentially showing students the progression of steps in solving mathematical problems.

Another important recent development has been the formation of the Alberta Online Consortium. Enhancement of provincial infrastructures to support online education was one of its central goals. The Consortium represents a majority of Alberta's K-12 and postsecondary students. One of the first tasks of the AOC was to seek a provincial license for WebCT.

WebCT is a software product that incorporates "course tools" into an integrated online instructional environment. With capabilities for organizing and presenting course content, managing both synchronous and asynchronous communication between students and teachers, providing a online assessment tool, and including a number of pedagogical tools such as an online glossary and student notation function, the software has and continues to be adopted by online schools. To date, NVS has adopted the software. MVS and EVS are planning to adopt the software beginning in September 2000. SVS has begun to investigate WebCT and is currently conducting research to ascertain the most efficient process of transferring files from Lotus Notes to WebCT. The increasing adoption of WebCT by online schools was creating a "de facto" common platform – at least at a software and tool set level. The adoption of a provincial WebCT license by both postsecondary and K-12 online schools was creating new opportunities for cooperation involving the sharing of digital content among educational institutions. This recognition of the potential for cooperation among institutions concerning course content had begun to create a different understanding of how to construct online courses. Courses could now be thought of as comprising discrete files from many authors. This concept of a modular framework was also beginning to change course development efforts by teachers. Instead of thinking of creating complete courses, the online teachers were increasingly thinking of course creation as a cooperative venture.

Across Alberta, cooperative efforts at developing course content were strengthened in June 1999 when the AOC invited online schools to identify high priority courses for development and teachers to work on enhancing and creating online content (knowledge objects) to be shared among Consortia members. The Content Development Initiative (CDI) grew from a recognition by online teachers and administrators who identified the isolation felt by educators when developing courses and the desire of many teachers to share the workload in developing online courses. To date, six development teams have been created and begun work. A number of courses will be completed by June 2000, while others are expected to be completed by June 2001.

A further development has been the announcement that after 24 months of development, Learning Technologies Branch (LTB) will be releasing multimedia segments that can be included in online courses. The multimedia segments – knowledge objects— have been created to address the objectives contained in the Alberta Program of Studies in areas such as Mathematics, Science, Biology and Physics. These knowledge objects will be supplemented by the release of four complete online courses. To further support the growing demand for online course material, LTB, and AOC will be coordinating the identification and creation of additional multimedia knowledge objects through teachers involved in the CDI.

As discussed in this chapter, the existing assessment tools available to teachers have been inadequate. Teachers identified a desire for more robust tools for assessing student learning. Two developments have begun to address these concerns. First, with the adoption of WebCT by many online schools, the available tool set has been strengthened to allow teachers to ask additional types of questions. Second security features contained in the software are allowing teachers greater options for administering examinations online rather than relying solely on parents or others to proctor tests.
Finally, some of the interviewed teachers recently remarked how much more certain they are of their decisions concerning professional practice. They suggested that one reason for their many teachers' greater self-confidence is that they are teaching online courses for a second year and that they are now better able to anticipate problems and intervene early. They also stated that they were able to correct many of the short-comings identified last year.

This chapter examined the complexity and variety of day-to-day interactions of online teachers. Teachers identified five typical categories of interactions: teacher-student, teacher-parent, teacher-teacher, student-student, and orientations and callbacks.

Summary

Teachers described their interactions with parents as significantly changed from their previous classroom experiences. Their interactions with parents were closer and more frequent. The absence of supervisory responsibilities and access to e-mail and the telephone made contact easier and more frequent between parents and teachers. Teachers also reported that when they interacted, it was often as partners where parents and teachers possessed similar information because of parents "*attending school with their children*." The "*transparency*" of the online classroom created greater opportunities for sharing information and working in concert. This cooperation was extended among parents and teachers where teachers required parents to undertake responsibilities normally carried by teachers within classrooms such as monitoring children's on-task behavior and supervising examinations. For all teachers, a central challenge of teaching online was to develop closer relationships and partnerships with parents.

Interactions between teachers were also altered by their involvement in online education. Whether teachers taught from a traditional school location, a formal office, or a home office, they characterized their interactions with colleagues as closer, more supportive, and offering greater opportunities for curricular collaboration. When asked to explain their relationships with colleagues, all teachers reported that the "*online experience*" had reduced the physical and psychological distance between themselves and colleagues. A lack of supervisory responsibilities, access to communication technologies and physical proximity among teachers at NVS, EVS, and SVS and a collective feeling of working together to "*pioneer*" a new form of education had created strong bonds. In addition, teachers reported that the responsibility for mastering the technology to author courses had created closer relationships

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symbols in subjects such as mathematics and physics only compounded the general difficulties of creating online assessments for students.

Several changes in professional practices and course development have occurred since the initial data collection was completed. These include greater use of web and multimedia materials, formation of the Alberta Online Consortium and its mission to enhance content creation by providing greater coordination among stakeholders, increasing adoption of WebCT by online schools, the Content Development Initiative involving six development teams, and release of multimedia segments by the Learning Technologies Branch.

Chapter 6

Technological Aspects in Online Education

Introduction

This chapter focuses upon the technological issues identified by teachers in this study. After some introductory content related to definitions, context and general technological aspects, it addresses three central matters: (a) bandwidth; (b) software; and (c) technological support. Online education is dependent upon the personal computer, the Internet, network bandwidth, and software to operate these new technologies. Also, online education is characterized by and therefore dependent upon both the hardware-software and the human processes that facilitate communication between student and teacher, while also making possible student access to online education content.

Definitions

"Technology" is used throughout this chapter in two interrelated ways. First, it denotes the machine-like hardware embedded in the personal computer and related digital networks. Second, "technology" is also used to describe the human processes and organizational practices (Keisler and Sproull, 1987) that are associated with the operation of emerging digital technologies for online learning. This second use of "technology" is closely aligned with the definition used by Holdaway, Newberry, Hickson, and Heron (1976) in their examination of organizational factors within educational contexts. They observed that technology encompassed both human and machine elements which often affected each other. The notion that technology affects all core practices of an organization was echoed by Dolence and Norris (1995) who stated that the introduction of information and communications technology had the potential to alter how education is conducted by challenging many of the theoretical and operational assumptions upon which education has been conducted. This "idea that technology encompasses both 'tools' and 'technique'" was emphasized by the Saskatchewan Instructional Development and Research Unit (1997). Consequently, this chapter examines technology from both the machine and human perspectives and the effects that both aspects of technology had upon teachers' professional practices. This use of the term "technology" rather than "technical" closely aligns with its use by Basalla (1988) who defined technology in terms of the machine and the larger human context in which technology is developed.

Context

New digital technologies and the growth of the Internet have allowed online education to rapidly expand in Alberta over the last four years. Online education was often characterized by all teachers as one sector of the K-12 educational community leading the search for new ways to use digital technologies to enhance the art of teaching and the act of learning. However, the hunt for new ways of using the Internet and associated technologies has not been trouble-free, but rather has been one in which teachers have been frustrated by technical problems while at the same time excited by the potential for meeting the learning needs of students in new ways. According to teachers, problems with pioneering new methods for teaching and learning have slowed the wider acceptance of online learning within the educational community. They often remarked that they foresaw the day when what they were "creating"--new methods of teaching using technology--would be adopted by schools throughout Alberta.

General Technological Issues

One of the chief surprises that arose in this research study was how little the teachers spoke about the technological details and underlying background programming architecture in their professional practice. Except in three cases where teachers possessed a technological background, teachers did not dwell on programming issues. When teachers did talk about technology it was often about specific problems encountered with either a piece of software or hardware. In general, teachers did not dwell upon the technological aspects of online education. None epitomized the popular conception of "computer geek." Rather, teachers discussed technology in terms of what it allowed them to do as educators rather than the many applications to which technology could be put. All teachers spoke about how technology had allowed them to think about teaching differently and how it had permitted them to bridge the psychological and physical distance between themselves and their students. They also remarked how technology had moved teaching to a pursuit independent of time and place. To some extent, they viewed online education as liberating them from the confines of the classroom. However, each admitted that this liberation came with a technological price.

When prompted to discuss their less successful experiences with online education, teachers identified their frustration with the current state of equipment and software tools. They commonly spoke about how they longed for the day when the promises offered by technological pundits could be fulfilled. Consequently, teachers reported a general dissatisfaction with the technical infrastructure necessary to fully exploit the potential for online education. In recounting the difficulties they had experienced with their use of technology, teachers reported problems in three major areas--bandwidth, software, and technical support. Although they had problems with the technologies used in online education, the problems they encountered had not diminished their enthusiasm for the application of technology to teaching and learning. Rather, most teachers wished for additional time to master the software and hardware upon which they based much of their educational practices.

Teachers reported experiencing challenges around inadequate or less than optimum, human and technological infrastructures to support online education. They described infrastructure as the necessary organizational capacity to support online education. From a teaching perspective, this encompassed the required Internet connection and connection speed for students, the essential hardware and software that both students and teachers used for online teaching and learning and the technological support for students experiencing difficulties. Therefore, rather than viewing infrastructure as a separate technological issue, all teachers to greater or lesser extents used the term "infrastructure" to denote the sum of the resources which supported their professional practices.

Bandwidth

Definition

The term "bandwidth" is defined for the purposes of this study to indicate the amount of data that can be transmitted in a given period of time over the Internet from one computer to another computer. Bandwidth is usually expressed as bits per second (bps). For example, a 14.4 bps modem is able to send 14,400 bits of data per second. This definition was consistent with how teachers spoke about bandwidth.

Differences in Bandwidth

Within Alberta a wide disparity existed in 1999 between the available bandwidth among students and teachers. While urban students and teachers along the so-called "digital corridor" between Lethbridge in the south to Fort McMurray in the north enjoyed a number of options around Internet access--including access to high-speed modem pools, cable internet, and new high bandwidth telephony connections--rural residents lacked many of the choices found in urban locations. In most cases, online schools relied upon Telus--the provincial telephone company--to provide dialup access for students. Generally, each online school provided each student in a online school with a dialup connection to the Internet and 100 hours of Internet access per month. If students used more than the allotted time they were then charged by the school for additional time at a preset price. In some cases, students in urban areas declined the standard service and purchased their own high-speed

Internet connections. When asked about the number of students with high-speed cable or telephony Internet access, the teachers suggested that while a small number of students had this "connectivity" they had noticed a decided trend among urban students towards high-speed connections.

Changes in Bandwidth

The migration of a small number of students to high bandwidth had not changed the consequences which low bandwidth has had upon online content development. Nor had existing bandwidth affected the reliance upon e-mail communication by teachers. While each online school had begun to investigate synchronous communication tools over faster networks, teachers recognized that equal access to the bandwidth was necessary for synchronous voice or video communication and that this was some years away. All teachers recognized that the cost of building and/or expanding the available bandwidth to rural areas of Alberta were at present cost-prohibitive. For that reason, they were resigned to "pushing the boundaries" of how they could offer online education over dialup connections to the Internet.

This lack of high capacity bandwidth resulted in online educators making purposeful decisions to develop courses that could be reasonably accessed over a 28.8 bps (bits per second) connection. John described the effect that bandwidth had had upon his teaching and course development activities:

> *Creating audio and video [course components] could be enhancements. However, bandwidth becomes an issue. So I think almost invariably with any kind of software enhancement, it's not just the absence of the product that is an issue, but the issue is a lot more complex and may not meet all the things that you want it to do. This lack of bandwidth often penalized the students who most required an additional option for learning, such as the rural students.*

Consequences of Inadequate Bandwidth

As a result of what teachers saw as less than optimum bandwidth capacity across Alberta, all online schools in this study had chosen to adopt the principle of "*equal access for all.*" This principle ensured that online courses and materials would always be accessible to all students regardless of their connection speeds to the Internet. The adoption of the lowest common bandwidth denominator for developing courses was a decision which exemplified teachers' beliefs about equality among students. All teachers in this study felt strongly that no student should be either privileged or disadvantaged because of connectivity. Teachers believed in "*leveling the playing field*" for all students regardless of their Internet connections. Online schools had adopted 28.8 bps connection as the standard connection upon which to build the infrastructure for online education.

As teachers struggled with the limitations of low bandwidth and their desire to incorporate multimedia content into their courses, they had begun to explore alternative means of delivering multimedia content to online students. One solution to low bandwidth investigated by teachers at NVS and SVS was the use of CD-ROMs to create hybrid courses. As Joan explained,

> *I've told Rick, a textbook, a CD, and online might be a nice course layout in that we're currently having a problem with bandwidths. Our lowest common denominator is twenty-eight-eight, and that's what I have at home, and sometimes it's darned frustrating waiting for this stuff to load. Well, if I'm running a quick-time movie to show a particular animation, it might be better to have that stuff on CD. So I have a vision of where I want to go, but I'm thinking that for a lot of your animations, a lot of your shock movies, considering the majority of our students are running off a twenty-eight-eight modem [28.8] right now unless that bottom line gets brought up and there's a lot more bandwidth infrastructure put into this province, that's going to be a problem for a while. And then I'm thinking, yes, maybe put those resources online, but perhaps have another button to say, Okay, if you don't have these resources, load them from your hybrid CD, so the web page goes right back to your CD and loads it on your machine instead of the link off-line.*

While bandwidth had affected how teachers thought about online content, restricted bandwidth also influenced how interaction and social learning occurred in online courses. Restricted bandwidth caused teachers to rely upon text-based interaction with students. Whereas text-based chat rooms were used for interacting with students and shared white boards were used for synchronous communication by some teachers with some students, a lack of bandwidth constrained their widespread adoption. The adoption of newly emerging synchronous communication tools was also constrained by bandwidth.

Darren, Bruce, and Bob remarked on their desire to adopt new synchronous software tools. Teachers wished for two-way video-conferencing or synchronous audio-conferencing. Still others--Owen, Elsie, Greg, and Tyler--hoped that online education would some day allow them to hold "classes" with students using new online tools such as Symposium® or Learnlinc®. However, these new online tools had proven to be ineffective over existing connectivity with current bandwidth. As Darren described the state of online synchronous communication tools and his frustration with emerging technologies that to be used effectively required faster connections to the Internet then most students had access to at present. He said:

> *Right now it's a bandwidth problem for using it realistically, with students. With colleagues that have a high-speed connection, we tried it, and it's marvelous. Right now, we're finding that we fight the technology more than we're communicating the concept--the original idea for communicating--so I just don't think at this time--I mean, the technology is getting better and better all the time, and I foresee the day when we will use that much more so. Right now not the video aspect. The audio, yes, we're going in that direction, but video is not there yet.*

For all teachers, inadequate bandwidth had presented challenges to their wishes to include multimedia components in their online courses and to begin using synchronous audio and video interaction as vital components of their strategy to build relationships. Nevertheless, bandwidth was the one area in which technology presented all teachers with frustrations over which they had no control. Unfortunately, inadequate bandwidth presented teachers with constraints to their efforts at course development and communication environments.

Software

Online education depends upon software to create an instructional online environment. Several products have recently been developed to address the growing demand for integrated online teaching and learning environments. Most online schools began operations by posting text-based course content to web pages and using e-mail for communication. In recent years the advent of new software packages has allowed teachers to develop course content which has incorporated audio, video, and pictures into course materials. New integrated software packages have emerged to provide imbedded pedagogical tools into a single online software environment.

Adoption by Schools

Integrated software packages have proven irresistible to online schools. Over the past four years, MVS and EVS had moved from web pages to the adoption of First Class® for their online school environment. NVS, which had originally developed courses using web pages, had taken the decision early in 1999 to move to WebCT for its online school environment. SVS had adopted IBM's Lotus Notes software package. Each school had examined a number of software products and adopted an integrated product to create online teaching-learning environment. Ease of use and simplification of posting course content, while also including various pedagogical tools such as student tracking and a glossary, have been crucial in the adoption of these new software packages. As a result, three online products emerged within the online schools in Alberta–Lotus Notes, WebCT, and First Class.

Software Problems

When asked about the software used to support online teaching and learning, only three teachers mentioned problems related to the underlying instructional design within the software products adopted by their schools. Rather, most teachers discussed how they used the software to communicate with students and how students would return completed assignments. Only two teachers reported serious dissatisfaction with the underlying design of the integrated teaching tools, except in area of specific functionality. Both John and Bob wished to have greater functionality and flexibility in how all the existing online tools handled online testing. They wished that online teaching tools would allow for greater diversity in how questions could be asked while also having greater ease in how graphics could be incorporated into online testing tools. This was especially important to Bob and John who taught senior high physics and mathematics where the need to depict complex formulas was best handled as a graphics file due to the complexity of the symbolic language of their subject areas. Other teachers from all four online schools expressed similar sentiments and reported difficulty with WebCT and its online testing functions, while some reported problems with Lotus Notes and irritation about loading graphic files into online course databases.

Assessment and Testing

In addition, all teachers reported that online assessment and testing functions needed to be improved. Several wished to move online testing from reliance upon factual recall to assessment strategies that incorporated higher level thinking skills. All were uncomfortable with those online assessment tools which limited how learning could be assessed.

Moreover, all teachers reported a need to have a process by which examination security could be determined online. They all required parents or other individuals to proctor or supervise children's examinations because there was currently no tool that could electronically supervise examinations online or ascertain that students were completing examinations unaided. The practice of soliciting parents to oversee examinations often produced problems for teachers. As John explained, "*tests are supervised by a parent or guardian, and the parent or guardian may be assisting in a way that I would not approve, and I'm not able to identify that.*" Consequently, the development of new online assessment tools, which could address both examination security and different methods of assessment, was a high priority among all teachers.

Software Compatibility

All five users of First Class described their desire to divide students into traditional groupings based on age. At MVS, all teachers talked about their wish to create chat rooms based upon interest and age rather than upon gender as had been the practice at the time of the interview. They felt frustrated by the technical limitations of the software to create or recreate traditional student groupings in their online school. Concerning their use of integrated teaching environments, the teachers began to describe the discrepancy between what they desired and the state of software development during the spring of 1999. All 13 teachers identified three characteristics and/or functions which they desired in a new online teaching tool.

First, all teachers wished for environments that could seamlessly handle cross-platform electronic file conversion issues and different versions of application software. Second, online teachers reported problems with students who were using software which was incompatible with their online courses. In some cases, these problems were related to conflicts in operating systems from Windows to Macintosh, but in other cases they also involved incongruities between different versions of a particular software. Joan elaborated upon this topic in this way:

> *You're right, because the machines we issue come with ClarisWorks 4 and 5, but consortium schools who are getting more and more involved in our program, if they don't have that software, then they feel that they're holding the bag in the sense that they have to go and upgrade all their machines and all their software to keep in line with us. So if we*

> *want to tap into that consortium market, we've got to be aware of what their needs are too. We can't always just have the latest and greatest.*

Third, teachers discussed the difficulty involved changing technical standards which often required students to download special plug-ins, i.e., specific additional components of programs which create additional functionality with a larger program such as Netscape or Microsoft Explorer. Bob explained the difficulty:

> *The functionality was a large part of it. We're dealing with an audience that's Mac and Windows, and you can't require a specific plug-in, because a lot of these kids just don't know even where to start; they don't even know what a plug-in is. I want to click here, and I want it to work.*

File Conversions

All teachers indicated a desire that their online environments integrate file translation protocols into file exchange functions to alleviate the need for converting files from one format to another. This capability would also solve some of the problems discussed in Chapter 5 on assessment strategies. Teachers described problems with marking student assignments only to find that, because of cross-platform or other conflicts between different versions of the same software, students,could not open up and review their comments or corrections.

Student Communication

Several teachers also identified a desire to communicate with students using more interactive means rather than relying solely upon text. Six teachers wished for more than the telephone for voice communication. Greg wanted online tools that incorporated voice and video and wished for more integration of existing technologies from telephone to video into a seamless environment where audio communication could be synchronous and where video could be rendered in "*real-time*." He described his desire for greater interaction in the following terms:

> *I would like to see software becoming available to talk to each other by computer in the telephone-style conversation, to videoconference, to telephone conference. I think that would be helpful, and I guess it's just a matter of waiting for technology to catch up with us.*

This desire for greater use of video to support interaction and instruction was echoed by Tyler:

> *I'd like to see, and I know they had it with the small little cameras where on the screen you could be able to teach for half an hour twice a week with a camera on me and have streaming video that goes into the student's computer, right then and there; bang, they've got it. And then we could have a synchronous chat as well, basically like a classroom experience, and it's there, there's no delay time or whatever.*

Integrated Teaching and Development Products

On another matter, teachers reported a desire for online teaching environments that could be integrated with existing content development tools. Software packages or tools for creating online content often were neither integrated into nor technically compatible with integrated online teaching and learning packages. This required that teachers learn how to use yet another software tool while struggling to integrate course development software with teaching and learning software packages. All teachers pointed out they needed better integrated products to minimize the technical complexity and delivering online courses, thereby reducing the time and effort required to constantly learn and master new software packages with little or no professional development support. The issue of professional development is discussed in detail in Chapter 8.

Student Reporting System

Finally, teachers reported a need for a networked student tracking, management, and reporting system that could assist them in tracking the performance of students in an online environment. Teachers at NVS reported that they were concerned that they could lose track of students. They observed that unlike face-to-face teaching where they would regularly see and interact with students on a daily or weekly basis and where students were required to interact with teachers, online students could chose to be silent and therefore invisible. The potential to "*lose contact*" with or fail to closely track students was also a function of the number of students for which each teacher was responsible. For both reasons, teachers wished for a software tool that could seamlessly integrate e-mail, assessment profiles, and completed student assignments, so student marks and progress could be reported to both students and parents as soon as data were entered into the software. Bob described his desire for new online capabilities as a never-ending struggle:

> *It seems like we're always in a state, this will solve our problems. But here we are, nine, ten, eleven months we've been working now, and none of what we've been told is going to solve our problems has solved our problems. So we're still trying.*

Technology Support

Overview

When visiting online schools and observing teachers in their work places, it became clear that in addition to the many tasks associated with teaching--preparing lessons, marking lessons, and communicating with students and parents--teachers had assumed the role of providing technological support to many students and their parents. Teachers spent significant amounts of time and energy replying to student inquiries about how to use their computers and how to make use of application software, a pre-requisite for learning online.

In attempting to address the high demand placed on teachers' time to provide technological support, online schools had begun offering orientation sessions for new students. These orientation sessions attempted to upgrade students and parents in the use of the various application software packages that are pre-loaded on school computers. However, the interviewed teachers generally reported that the practices were too new to allow evaluation of their success.

Specific Approaches

Online schools had tried a number of different models in an attempt to determine how best to teach students the technological skills required for online learning. NVS teachers traveled throughout the province to set up regional half-day meetings where students and parents were shown how to use their computers. EVS had chosen to send teachers to students' homes to deliver and set up students' machines thereby allowing parents and students the opportunity to "meet" the teacher and ask questions about how best to use the computer. MVS had used both half-day orientation sessions and to a lesser extent home visits to orient students. SVS encouraged parents and children to "visit the school" to be oriented on how to use the computer. However, as almost all teachers reported, for novice online students the learning curve was great and the time provided was too short for students to acquire a working knowledge of their new learning environment. Consequently, all teachers reported spending a majority of their time in September answering technological questions from students. As Denise made clear,

> *We have people there that don't even know how to use a mouse, don't even know how to double click. We have the same orientation for both groups [experienced and novice], and we're teaching them how to use ClarisWorks, how to make a table, how to change your font, how to change your size.*

While general questions about how to use a computer were common in September, teachers were often confronted with specific questions from students about how to dialup and make a connection to the Internet or how to send e-mail and how to name, store, and send files to teachers. Operating system questions about lost desktop icons and other technical problems consumed many hours of teacher time. Tyler felt that one reason why teachers were often contacted for technological support was because they were the primary contact that students had with the online school. Most teachers agreed with Tyler's position and found this to be an affirming result of their attempts to build positive relationships with students, even though it presented them with serious time challenges.

NVS, MVS, and SVS had attempted to provide support to students through hiring technological support personnel to answer student questions about how to use a certain software programs or other specialized questions. However, according to 11 teachers from these schools, students still contacted teachers for assistance with computer problems. A few teachers surmised that, because many of the questions involved both technological and pedagogical aspects, it was easier for students to talk to a teacher who could both solve the technological problems and the associated curricular difficulty encountered while attempting to complete an online assignment. Denise described the linkage between technical questions and curricular activities. She explained that students would begin by asking how to install software from a CD-ROM and then move to asking about the recommended procedures for storing and exchanging files with her. Denise described a typical encounter with a student in September who required both technological and pedagogical guidance:

> *" I have a CD. What do I do?" And that's where they start; that's the phone calls I get. So I'll tell them to put it in and-first of all I'll say, "Do you know how to install it?" Yes or no. And so I'll either say, "If you know how to install it, then install it, and then this is how I want you to name your mathematics file. So I will tell them what to name their file, and then I'll have to go into the whole spiel about how to send it and the progression: You start at this end, you work to here.*

Other teachers offered more compelling reasons why students phoned or made contact with teachers. Simply stated, students felt more comfortable talking to teachers than to support personnel whom they had not met and knew little about. Familiarity was obviously an important factor in feeling at ease when asking for assistance. In other cases, the technological support personnel were so busy that many students and parents found it easier to contact teachers. Bob observed that, while schools had begun hiring technological support personnel, they were extremely busy:

> *Currently, we don't have the staff capable of doing that; we just don't. We're all teachers, right? And our computer tech guys are run off their feet just doing desktop technical support to support the staff and the kids. And unless we train somebody from within, that's not going to happen.*

In response to the technological questions that they encountered, many teachers were attempting to write their own technological support resources. These resources attempted to anticipate student and parent questions and to produce an online resource for online learning and the questions that often arose related to how to operate the computer. Bob described his efforts at writing a Frequently Asked Question (FAQ) file for his high school courses:

> *I prepared a two-page Introduction to High School Science handout, which took me too long to make because you ended up answering the same questions on the phone a thousand times over. Finally I said, Enough's enough. I'm going to prepare this with all the frequently asked questions, was sort of the idea that I went with, fired it out, and it has minimized the calls; it's cut them down a lot. And I put it online too with a link to it saying, "If you want help, go here first when you're starting out. If you still have questions, then phone."*

Many teachers at SVS and MVS were also attempting to create online technologicall support materials for students and parents. As teachers became more familiar with online education in general and with the technological problems faced by students in particular, they were planning to develop FAQ files for students and parents.

Recent Developments

Since the initial data collection phase of this study was completed, several technological developments have occurred. The pace of technology innovation continues to accelerate and teachers continue to search out and where appropriate adopt new tools to complement their teaching practices. New compression technologies for reducing file sizes to facilitate their transfer to students and cheaper CDROM technologies have helped teachers to continue their adoption of multimedia objects into their online courses. However, although there has been a proliferation of new software products and newer versions of software packages released over the past nine months, teachers still report that their primary concern remains how new technologies allow teachers to better "*reach and teach*" students.

Inadequate bandwidth continues to plague online education and the efforts of teachers to deliver multimedia enhanced online courseware. Teachers have reported that problems of inadequate bandwidth are worsening each month. In recent discussions with teachers they reported developing and incorporating more multimedia objects into their courses. However, the effectiveness of such knowledge objects has been blunted by inadequate bandwidth. This is especially true when teachers are developing new courses such as Career and Technology Studies (CTS) where multimedia play an important pedagogical role. Teachers indicated that, with an increase in the number and type of courses available to online students, increased congestion over wide area networks (WAN) in school districts is increasing.

Inadequate bandwidth continues to affect teaching practices. During recent discussions with teachers at NVS, they indicated their continued desire to adopt some form of synchronous online collaborative tool to allow greater interaction with students. Yet, once again, they cited problems with bandwidth as the chief impediment to the wider adoption of synchronous teaching tools.

The widespread recognition of the problems associated with inadequate bandwidth continues to have upon online education has led Alberta educators to seek solutions. At present, (winter 2000) one pilot project and a number of innovative technology projects are under way to address inadequate bandwidth.

In partnership with Alberta Learning, the Northern Alberta Institute of Technology, Grande Yellowhead Regional School District, and the Alberta Online Consortium, a pilot project is underway to test the hypothesis that large multimedia files (courseware) are better delivered to site-based and online students in schools by storing those files on local school district servers and delivering them to students over jurisdictional WANs. Courseware files would be transferred to school district servers using existing connections throughout the evening and weekends when Internet traffic is least congested. Students would access courses over WANs where bandwidth is less of a concern. This project will begin initial trials in early 2000.

A second possible solution to inadequate bandwidth is the construction of wireless WANs by eight rural school districts across Alberta. Use of new wireless technologies should allow greater numbers of students from small schools to access online courses from computer labs at substantially faster connection speeds than currently available. The first tests of these new wireless networks are scheduled for early 2000.

In addition to bandwidth, a number of recent developments have occurred in the development of teaching tools and in database tools. NVS has developed and has begun using an online database to record and report student progress to all staff. This online tool has allowed teachers to access complete student files with up to date student progress including marks, a history of communication with parents, and technical information concerning the type of hardware and software used by students. Teachers have reported that the database has helped them gain a better "*picture*" of their students and has helped them maintain better contact with students. They described the positive effects that knowing more about their students had upon their efforts at "*relationship building.*" The success of this product has led to initial discussions with administrators from NVS, MVS and EVS to adopt a similar solution to that used by NVS at their school.

Finally, teachers still report no solution to their desire for better online assessment tools. However, the search for a solution has been joined by Alberta Learning. Personal discussions with the Deputy Minister of the Alberta School Improvement Program, Dr. Jim Dueck, and with the Assistant Director of Student Assessment, Mr. Ron Cammerant, revealed that Alberta Learning has begun to examine the feasibility of allowing students to write provincial Achievement and Diploma Examinations over the Internet. Both officials reported that with greater numbers of online school students wishing to write their examinations online and many more traditional school students already writing examinations within school computer labs, it was timely to begin to develop a plan to migrate provincial testing to an online environment. They expected that a pilot program would be in place for the fall of 2000.

Summary

The teachers were generally less concerned with aspects of the underlying technology that facilitated online learning than they were with how technology could be used to support teaching and learning. All spoke about the technological challenges which inadequate bandwidth, technical support, and the current state of instructional software.

All teachers described the pedagogical effects which inadequate bandwidth had had upon their desired teaching practice. Figure 6.1 illustrates the influence which inadequate bandwidth had upon their teaching practices. All teachers reported that inadequate bandwidth resulted in reduced opportunities to incorporate multimedia files into their courses and consequently they relied upon text-based course content more than they wished. Communications between students and teachers were restricted to e-mail, due to insufficient bandwidth, to adopt new audio and video communication tools for synchronous messaging. Finally, in response to the diversity of bandwidth available to online students, all teachers felt it necessary to adopt the principle of "equal access for all." This principle caused teachers to develop courses that provided a common and equal online learning experience for all.

Technological support issues were also a concern for teachers. Teachers reported how the challenge of being first-in-line to answer the many questions which arise in a complex technology-rich environment, such as online education, resulted in anticipating questions and producing FAQ files for students and parents. These files were an attempt to foresee where

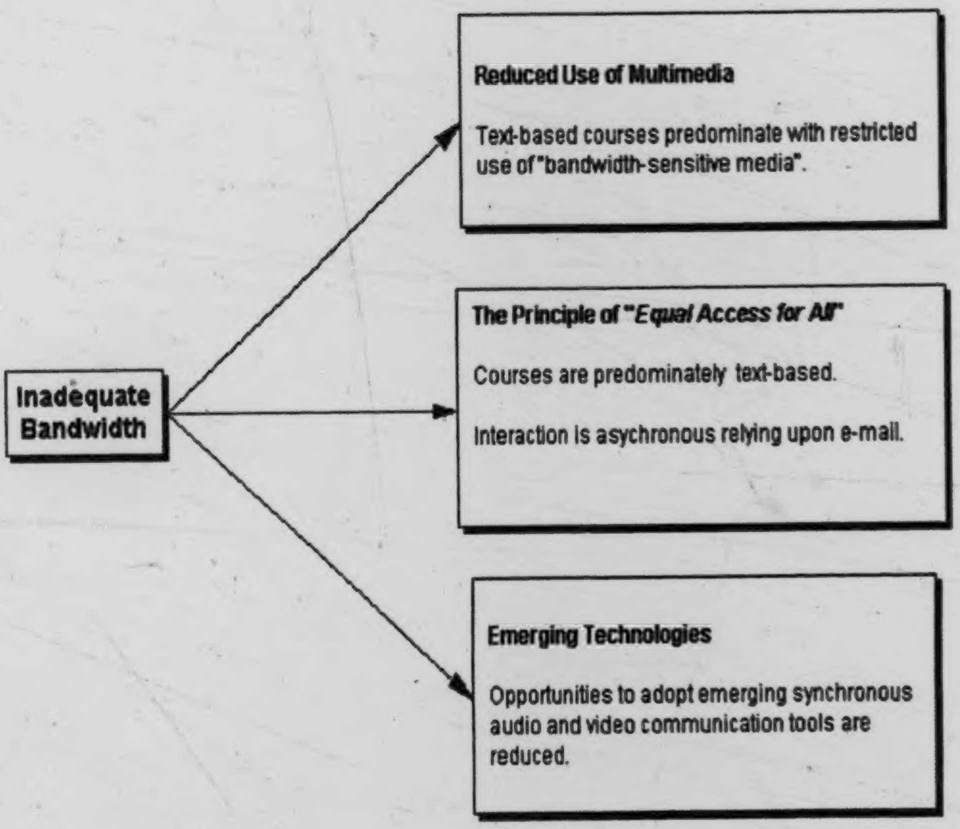
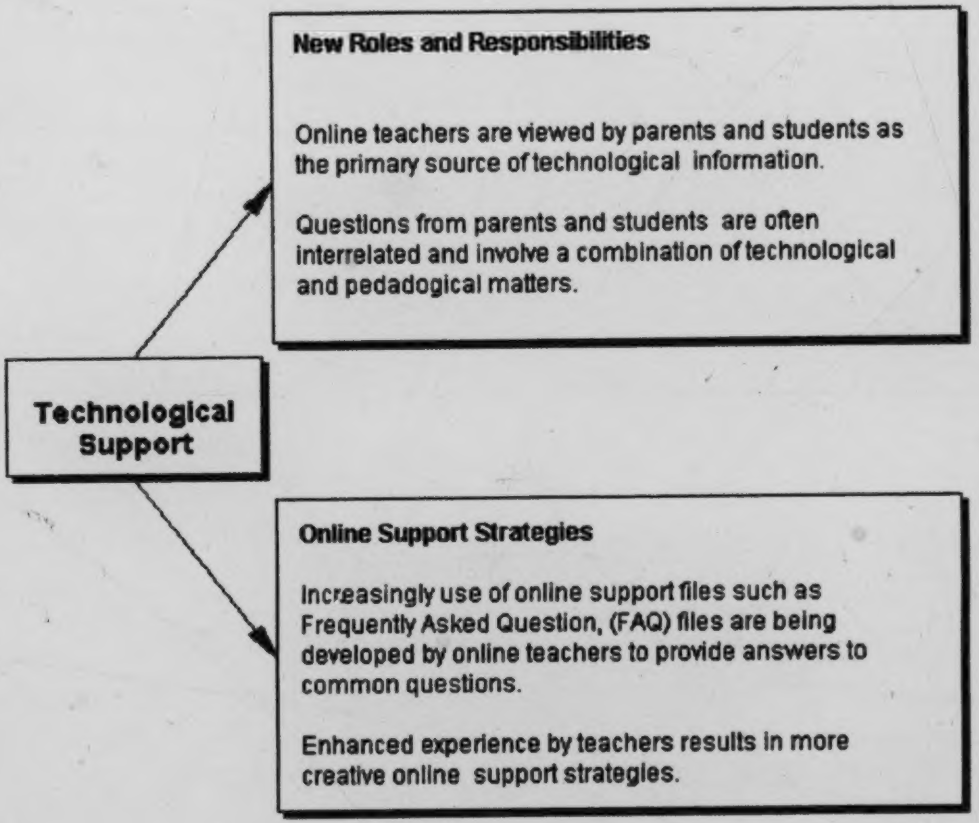

Reduced Use of Multimedia
Text-based courses predominate with restricted use of "bandwidth-sensitive media".
The Principle of "*Equal Access for All*"
Courses are predominately text-based.
Interaction is asychronous relying upon e-mail.
Inadequate Bandwidth
Emerging Technologies
Opportunities to adopt emerging synchronous audio and video communication tools are reduced.

Figure 6.1. Aspects of inadequate bandwidth in online education.

technological or pedagogical problems might occur, and to provide an online resource. Although FAQ files and other online resources were developed by teachers in an attempt to provide answers to common questions before parents or students needed to resort to contacting them, a majority of teachers did not anticipate a reduction in calls directed to them rather than the online school's technological support personnel. Teachers felt that due to the interrelated nature (pedagogical and technological) of many student questions, and the general comfort which students felt in communicating with their teachers, that telephone contact would be reduced but not eliminated by additional online support.

The teachers reported a number of issues with existing software tools currently in use (Figure 6.2). All teachers reported their increased reliance upon integrated online teaching tools such as First Class, Lotus Notes, and more recently WebCT than previous teaching practices that used web pages. These new software packages integrated many but not all the tools with which teachers wished to teach. All teachers reported two areas that required additional attention by software developers. First, the issue of online assessment had important technological facets. Teachers--especially online math and physics teachers--reported their frustration with online testing regimes that could not satisfactorily support the insertion of graphic files into online testing. Second, each online teacher reported general dissatisfaction with the restricted types of questions which could be asked of online students. All teachers wished for more online testing options to match their planning and course delivery options.

Finally, all teachers discussed their desire for greater integration of the software tools for multimedia and content development with delivery software (Figure 6.3). Development of course content was made more complex than necessary, according to those who were interviewed, partly because of the requirement to master a variety of software tools for content delivery and course creation.



New Roles and Responsibilities

Online teachers are viewed by parents and students as the primary source of technological information.

Questions from parents and students are often interrelated and involve a combination of technological and pedadogical matters.

Online Support Strategies

Increasingly use of online support files such as Frequently Asked Question, (FAQ) files are being developed by online teachers to provide answers to common questions.

Enhanced experience by teachers results in more creative online support strategies.

Figure 6.2. Technical support issues in online education.

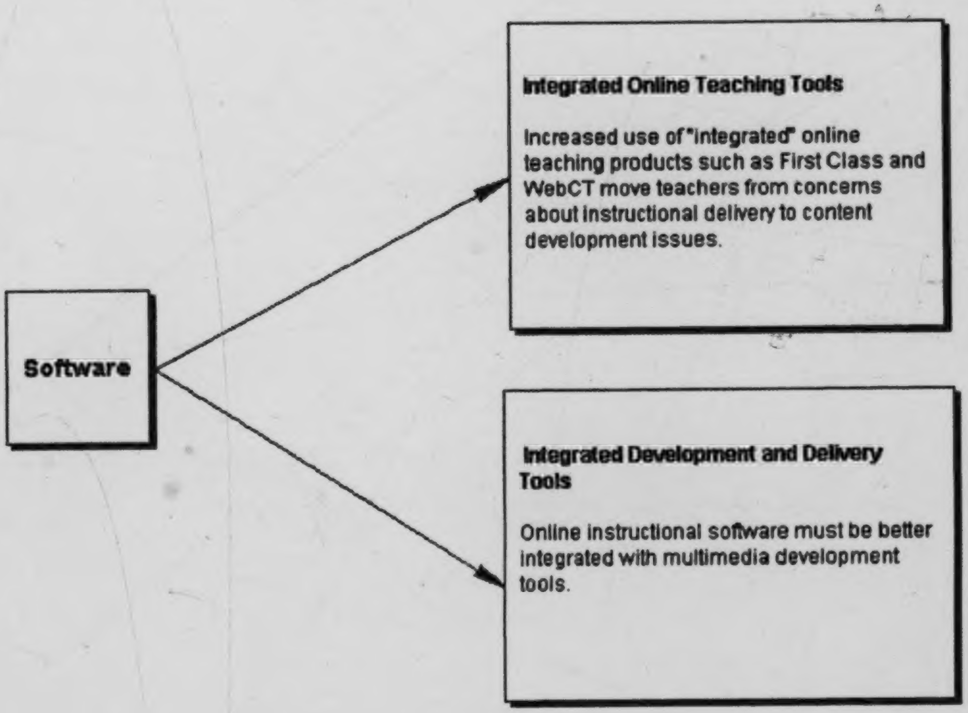

Software
Integrated Online Teaching Tools
Increased use of "integrated" online teaching products such as First Class and WebCT move teachers from concerns about instructional delivery to content development issues.
Integrated Development and Delivery Tools
Online instructional software must be better integrated with multimedia development tools.

Figure 6.3. Software issues in online education.

Chapter 7

Professional Challenges

Introduction

This chapter reviews the professional challenges which teachers identified resulting from the introduction of online education. This chapter focuses upon the perceptions of teachers concerning how their professional lives have been changed by their involvement in online education and the challenges that these changes have presented to them and the online schools which employ them.

All teachers raised many issues concerning the changing nature of their professional responsibilities. Issues associated with the opportunity to work from non-traditional sites such as from an office, from home, or from locations outside the province raised questions and concerns for both teachers and administrators. All of the teachers also mentioned the personal stress that they felt arose from teaching online where "anytime anywhere" education often resulted in teachers volunteering to extend their teaching day.

Another professional challenge explored in this chapter was the need expressed by teachers for specialized professional development opportunities. Finally, this chapter examines the effect that market forces have had upon teachers concerning the competitive nature of online education and job security.

Teachers' Roles and Responsibilities

All teachers described the unease that they felt in adapting to the changing roles and responsibilities which online education had upon their day-to-day teaching activities. Except for a single teacher who had begun his teaching career at NVS, all teachers interviewed for this study had followed a similar career path. Each had attended a face-to-face school as a child. All had attended a university where teacher training focused upon the skills required to be a successful classroom teacher. None of the 13 interviewees had been introduced to distance education materials during their pre-service teacher training and none had been exposed to teaching skills applicable to teaching online. Neither had any of the 13 teachers been exposed to practical or theoretical instructional design models which they felt could be applied to a online school environment. As a result all of the teachers made constant reference to the differences between their previous teaching roles and responsibilities as classroom teachers, and to the new professional practices of online teaching. Nine of the 13 teachers interviewed were either in their first or second year of teaching online and therefore were acutely aware of the differences due to their move to online teaching. The five MVS teachers with more online experience were also aware of the differences between their previous teaching assignments and their present teaching positions having lived through the early days of online education in their schools and throughout Alberta.

Multiple Responsibilities and Finding Balance

All teachers were asked to describe their professional lives in terms of their roles and responsibilities as teachers. Teachers described three areas where they felt that their roles and responsibilities had undergone the greatest change: (a) how teachers provided instructional and emotional support to students (see Chapter 6); (b) the expectations associated with authoring online courses while maintaining a full teaching load; and (c) the requirement to provide ongoing technological support to students and parents.

These three areas of greatest change in teachers' roles and responsibilities led teachers at all online schools to speak about the difficulties they faced when attempting to find a balance between their many new responsibilities. They identified the multiple responsibilities of providing instruction and authoring online courses as being particularly stressful. Both novice and experienced teachers spoke about how they felt torn between their desire to concentrate on teaching and the constant need to develop new online course materials.

The issue of "balance" was significant for first-year and second-year teachers who were faced with developing more than one online course. Teachers at NVS and SVS who were developing new online courses found the multiple responsibilities of online education personally stressful. All teachers at NVS felt that the expectations of both teaching and course development were time-consuming and stressful. Teachers at NVS found it difficult to establish a balance among the many professional tasks facing them. Joan explained the central issue faced by NVS teachers in this way:

> *The administration needs to define whether I'm a teacher or I'm a developer. You're not going to get the best of either if I'm pulled between the two because there are going to be students that I'm not giving enough attention to, or my courses are being developed haphazardly simply because I don't have the time to dedicate to that.*

In elaborating on her feelings of being torn between concentrating on making connections with students and course development, Joan's reaction was typical when she said she felt more comfortable "teaching" than developing course content. She believed that communicating with her students and supporting their learning could produce better results than would concentrating on course development:

> *Because of what I was given as a load, I would not have been able to keep it. It would have got to a point where students would be forced back to the basic program because I would not have the materials online. So at least in doing it this way, I got everything up online. I had everything. All the examinations were online, and all the downloadable files were online before Christmas. Now, I haven't gone forward and developed any more simply because my focus after that was to bring up my bottom line, bring up my at-risk kids, and so my focus was to keep up on my marking. I developed some online final examinations so that they can do them with the proper online format. I have Grade 7 to do, and bring up my bottom, bring up my at-risk kids. I wanted to get those ones through, and I did not want to go ahead and develop and lose those guys too, so I wanted to go back to the teaching aspect after a while.*

Darren also described the difficulties he had in establishing a comfortable balance between the requirements to develop courses while at the same time teach full-time. When discussing the multiple responsibilities of teaching fulltime and developing courses, he suggested that the type of materials he had to develop contributed to the his feelings of stress. He pointed out that, while classroom teachers had a responsibility to develop instructional materials, they could draw upon existing resources available within schools. Pre-service preparation had equipped classroom teachers to carry out the development of instructional materials.

However, in online education, the expectations for complex multimedia content from parents, administrators, and students added to Darren's concern about rising expectations and static resources. He stated that the general expectation that online courses should contain a variety of media types such as audio files, graphics, active demonstrations (java applets), and moving pictures (mpeg files) was one example of the growing expectations faced by online teachers. Preconceptions of online education as a multimedia learning experience had resulted in him feeling unable to meet the expectations for both complex interactive course materials and rising demands for regular interaction with students:

> *A lot of the things that we've talked about in terms of the multimedia in the lessons and enhancing a lesson with some of those things such as with real-time voice are based on having the time to really pursue it and to follow up., I just haven't had the time this year. Again, if I had that one year where I didn't have new material to develop, I think I could pursue some of that much further. I'd love to spend a lot more time with the real-time voice. We talked about group work. That would change the whole dynamics. We talked a bit this morning about the teaching and the developing, the two aspects, and I think right now when you're doing both, you don't do either as much as you would perhaps like.*

The response from organizations to questions concerning new and multiple responsibilities of online teachers was discussed very carefully by each teacher. All teachers were reluctant to discuss what their employers were currently considering to address the issue of workload. Teachers felt that that, even though their comments would be reported anonymously in this study, any criticism could be perceived as placing their particular school in a poor light. As one teacher explained, online education was a new phenomenon and any criticism of it by online teachers might possibly play into the hands of the many critics of online education. After all, as this teacher observed, online schools are competing for students and struggling to survive and negative comments could be misconstrued.

However, teachers did have their own suggestions for addressing workload. Some suggested that student-teacher ratios purposely be kept small to allow teachers time to concentrate on course development. Others suggested that teachers be given assistants to help them manage the day-to-day tasks of printing assignments, acknowledging receipt of assignments, and other administrative duties such as downloading assignments or entering information about assignments into various shared student databases.

One suggestion which all teachers said would help them personally and online education in general was for Alberta Education to develop online courses following a similar pattern it had used for distance education print materials. The Learning Technologies Branch had developed correspondence courses and sold them through the Learning Resource Distributing Centre. This central development process would remove teachers from the many chores of developing content and free them to concentrate on teaching.

Work Locations

One of the many unique features of online education has been the opportunity for teachers to teach from a variety of physical locations. Unlike traditional teachers who are required to undertake their teaching from a specific physical location, online teachers are able to teach from any location with access to the Internet. This opportunity for teachers to work from various physical locations had resulted in a variety of teaching-working arrangements among the four online schools in this study.

Specific Locations

At NVS, teachers worked from an office building located on the edge of a small town. Each teacher worked in an open office plan. In contrast, all teachers at MVS taught from home. Each online MVS teacher had set up a home office and, except for attending school-wide meetings or participating in professional development activities, MVS teachers rarely visited their school office. Teachers at EVS had chosen to work from offices located in the local high school. Both Greg and Tyler (EVS teachers) felt strongly that they benefited from working from a traditional school location. While they had worked from home for short periods, each both said they valued the interaction and vitality that interacting with students on a daily basis provided them. At SVS, teachers also worked from offices within a traditional high school. Except for Elsie and Owen, the other SVS teachers were also required to teach within the regular high school program. Consequently, working from home was not considered to be possible for teachers with dual responsibilities.

Home Location Issues

Yet, while the ability of teachers to teach from various locations was technically possible, teachers from NVS and SVS noted how this newfound possibility had presented problems for their local school administrators. In particular, teachers from NVS and SVS had encountered resistance from their school districts concerning the issue to teach a portion of their work week from home. Interviewees described how unprepared their schools were to embrace new opportunities associated with online education. They observed that new technologies and their potential for reshaping employment arrangements had not kept pace with the ability of organizations to accept new employment opportunities. As one teacher stated, school administrators were unable to accept the notion that teachers could work from home and still effectively teach students.

In attempting to explain the reluctance of school officials to examine the issue of working from home, one teacher from NVS suggested that school officials were concerned about how such arrangements might be viewed by other staff members. According to several teachers from NVS and SVS, school administrators were fearful that if teachers were able to work from home then other employees could make similar demands.

Another reason cited by the teachers in explaining the reluctance of their employers to allow teaching from home was the possible cost of equipping home offices for teachers. They felt that school administrators were apprehensive that if teachers were given permission to work from home, demands from teachers for reimbursement for costs of home computers and Internet access would follow. Such costs might then need to be borne by the local school district. This was particularly worrying for school administrators, who, according to the teachers, were very concerned that new employment arrangements could lead to contractual conflicts with the Alberta Teachers' Association.

The issue of working conditions, and especially working locations, was the most sensitive topic which teachers discussed during interviews. The sensitivity of teachers to how their comments could be perceived often resulted in teachers changing the topic. When this was pointed out, the general reaction was one of apprehension that negative comments could be perceived as a criticism of online education rather than simply an employer-employee issue.

One online teacher who had been led to believe that at some point teachers would work from home spoke about her reaction to "*broken promises*":

> *That was a big part of it [working from home], because when I was interviewed, my youngest was going to Grade 1, and they said, "You'll be able to work entirely from home. If you want to come into the school, you're fine; if you want to be at home, you're fine." And I thought, that's perfect, because I can still volunteer at my kids' school. I was the chairperson of the Parent Council, and when my little guy's throwing up in a bucket, I can type with one hand and hold the bucket with the other. This is great! They won't miss me. And the board just didn't buy that. That was part of the draw, and I got told, 'No. there's a bit of a problem. The board just doesn't believe that you'd actually be working if you were at home. So for at least the first couple weeks, can we put you with Owen to work together?' And I thought, That's great. I can do that for a couple of weeks because I need these people too, and I didn't know anybody coming in; I had no solid group that I would identify with or ask, so I thought I need to make those kind of connections. And then the two weeks stretched to forever. It was even,*

> *"Make your own hours. If you're a morning person, the kids can access you any time. If you want to start at six in the morning and be done at noon, that's fine." So there was nothing; it was just so flexible. I thought, How can you turn that down? I bragged about it; I made people jealous: Oh, I can work whenever I want. If I am a night person, I can work all night.*

However, as the school year unfolded, a traditional working pattern emerged and rapidly became the norm. Symptomatic of the status quo was her request for time off to attend a family function. At first her request was denied. Subsequently it was approved although she was required to reimburse the school jurisdiction for a substitute teacher even though as she explained the substitute teacher did not possess the skills to carry out any of the responsibilities associated with teaching online. To her, this incident illustrated the traditional thinking of her employers:

> *I asked for the time off, and they made me pay for a sub. And I said, 'I don't need a sub. Nobody can do my computer. There are no kids who are going to miss me. I will e-mail everybody that I'll be away for this day, and I'll be back the following day and I won't have to pay for the sub.' So there's just no understanding of how this could be or what it should be.*

As she explained, one reason cited by her district administrators for its refusal to grant her leave with pay was their concern that other teachers might abuse the system even though the technological environment allowed teachers to work from disparate locations and to make-up and complete teaching tasks outside traditional school hours: She said that

> *They're afraid of abuse of the system, and I can understand that from a clerical point of view, but on the other hand, everything I touch on this computer is time spent. They can check if they want how often I was on and when I access. They will not give us our Internet connection from home.*

Clearly, the move from a traditional pattern of employment to one which recognized the power of new technologies to transform the "traditional workday and location" was a difficult challenge to school administrators.

Nonetheless, not all teachers wished to teach from home. Bob, who was in his first full-time teaching assignment, did not wish to exclusively teach from home. While he wished to teach from home for a portion of his work week, he acknowledged the positive benefits for first-year teachers to teach within physical proximity to colleagues. He cited the benefits of consulting with experienced colleagues and the opportunity to ask for advice:

> *The camaraderie and the sharing that goes on here is incredibly important. But in the same breath, if you work at home you get ten times the amount of work you get done here without the distractions.*

Other teachers including Greg and Tyler had chosen to teach from a school location. As with Bob, the opportunity to interact with online colleagues was important to them while also feeling they belonged to school staff. Greg identified another benefit. He described how he had initiated a partnership with a classroom teacher to produce an online biology course:

> *I initiated a conversation with Bob Jones, who's a teacher here, and Bob and I sat down one day after school, and I basically approached Bob about, would he be open to a sharing situation? I'm starting from scratch and I realize you have the course, and you've done an excellent job of it. Would he be open to such sharing your course materials? We talked about what he had to offer and what I had to offer, what you would be getting in return and what I would be getting. Bob gave me everything, and at the end of the year I would give him everything that I had developed. It was almost like a complete swap of materials.*

He doubted that this opportunity would have occurred if he had not been teaching from an office within the local high school.

Greg also explained how important working with Frank was when as a first-year biology teacher he felt he could benefit from the experience and guidance of a more experienced biology teacher. As Greg made clear when recounting this event, without the opportunity to work with Frank he would have worked in isolation and could not have authored the quality of course he had developed. He would not have had access to both successful classroom materials and to a colleague who could mentor his first attempt at teaching biology. Bob too benefited from his collaboration when he received the online biology course that he planned to use to his classroom teaching.

Stress

Stress was the one issue that all teachers identified as causing them high degrees of concern. All teachers independently raised feelings of personal stress related to workload and all identified three areas of professional activities they perceived as the three overarching root causes of their stress. First, as discussed earlier, teachers remarked on how the current expectations of employers to concurrently teach while authoring online courses was extremely stressful. A second stressor was the expectation both from themselves and from parents and students to be accessible on a 7-day, 24-hour basis (24x7). A third source of stress was the lack of adequate time to handle the many day-to-day responsibilities of marking, answering e-mail, participating in online discussions, building online relationships with students, and other online teaching tasks. These were related to multiple professional responsibilities, tesk complexity and family/work responsibilities.

Stress and Multiple Responsibilities

Teachers from all four online schools spoke of the stress associated with the multiple responsibilities both of teaching online and authoring digital course materials. All teachers described how teaching had become time-intensive in an online environment. They felt that few administrators, except those directly involved in teaching online, had a clear understanding of the complexity involved in simple everyday jobs in an online environment.

Most teachers spoke about their first year of teaching online as "*being in survival mode.*" They likened it to an arduous trip that when completed would be worth the effort, even though the journey at times was uncomfortable.

Stress and Task Complexity

Darren compared the simple task of a student submitting an assignment in a regular class to the more complex and time-consuming process involved in an online environment. In a classroom, a teacher would simply acknowledge receipt of an assignment and often thank the student who had completed the assignment. The classroom teacher might place the assignment with others to mark later, recording on a written page that a particular student had handed in the assignment.

However, a online teacher would, as Darren explained, first boot-up the computer and connect to the Internet. Darren would then select his e-mail program, start the program, check his e-mail, and search for messages where students had attached a completed assignment. After identifying the message and the assignment, Darren would check to see that the assignment file had been correctly named and save the file to an assignment directory on his computer hard drive. If necessary, he might be required to convert the file from one file type to another depending on the type of computer and software that a particular student had used in completing the assignment. Darren would then record receipt of the assignment in a student database and compose an e-mail acknowledgement to the student confirming receipt of the assignment and encouraging the student to move ahead with the next section or assignment of the course. Only then would he begin to review and grade the assignment. As discussed in Chapter 5, the complexity of receiving assignments mirrored the difficulty of grading assignments. According to Darren, this process was repeated for each student and for each assignment completed. With little or no extra time provided to complete these administrative tasks, teachers felt the stress associated with too much to do in too little time.

This complex and time-intensive work noted in day-to-day teaching also occurred in course development. Teachers often spoke about the requirement to "author" new materials. They often likened this task to authoring a book in which content was created for the first time. With little digital content that they could readily draw upon to include or adapt for online courses, teachers felt that they were required to create everything for the first time. The stress of creating new courses was increased because, as stated earlier, none of the 13 teachers in this study had received formal pre-service preparation in theory or practice related to distance or online education.

In addition, teachers spoke about the pressures of authoring new course materials which they considered would soon become public. Because all courses were available on the Internet, and because parents and other teachers could access and view these courses, teachers felt the added pressure to develop material that incorporated the latest capabilities of the Internet. Moreover, teachers observed that their courses would be open to scrutiny and therefore needed to be of the highest quality. If they had the time to focus on course development they could develop exciting material and would feel quite comfortable with public scrutiny. However, in an environment where teachers were concurrently teaching and developing courses, the pressure to "*do it all*" left many teachers feeling exhausted. To keep pace with the multiple demands of teaching online, every teacher reported resorting to extending their working time to include evenings and weekends.

Stress and Family/Work Responsibilities

Most teachers described how they had extended their workday to include checking e-mail before they went to bed and before breakfast in the morning. A universal concern among teachers was the consequences to family and friends of overly extending their working time.

Darren acknowledged that the stress of working most evenings and weekends had resulted in him spending less time with his young family. This dedication to work had begun to affect his family life. The strain of working at all hours and the resulting stress upon his family had caused him to consciously limit the time he now spent in his home office. Without this effort to control his workday, he worried that he would miss seeing his young family grow up. However, the effort was difficult when there seemed so much to do to keep ahead of the "*mountains of work*."

George echoed Darren's efforts at limiting his time workday and spending more time with his young family. While observing George in his home office and sharing a meal with his family, George's wife remarked how stressful it had been for her and the children during his first three years of teaching online and how hard it had been to see her husband working most evenings, weekends, and summers without a break. She described the strain that course development and teaching had had upon her husband. This was especially noticeable because George taught from home. The strain of over-working had caused both Darren and George to seek boundaries between work and home life. They had tried to not visit their home offices after supper and to take at least one day off each weekend. While each had worked hard to establish these new boundaries, both confessed to working weekends during mid-term and final examination week. As George said: "*I don't have any more time than a classroom teacher, but I have the flexibility of time. And so if I am willing to invest extra hours into it, I have the leisure to do* that." However, he also added that flexibility could lead to excessive hours working at the computer.

The need to establish boundaries between the demands of teaching online and one's home life did not apply only to teachers who worked from home. For teachers such as Elsie who taught from the local school, the necessity of working long hours also existed. She mentioned how hard it had been to limit her teaching activities to the traditional teaching day and how during her first year teaching online she had often taken work home to complete in the evenings or during weekends. This tendency to work "*all the time*" had also caused a strain in her family life. Elsie recounted how her husband had asked her why she had chosen to teach online and suggested she might consider returning to the regular classroom for the sake of the family.

Professional Development

All teachers agreed that online schools needed to provide more opportunities for professional development than the few days now scheduled. Teachers felt overwhelmed with the new skills and knowledge that they were required to master in order to successfully carry out their professional responsibilities. If teachers are to provide the level of technological support to students and parents which online schools require, then they agreed that it was essential that ongoing professional development opportunities be provided in these priority areas: (a) content development and delivery tools; (b) hardware and software systems used by online students; and (c) the latest thinking in instructional design and pedagogical matters.

Specialized Professional Development

All teachers remarked how important further inservicing was to enhance the ability of teachers to better support the rapidly changing hardware and software tools available to online schools and online students. First-year teachers from NVS and SVS discussed the importance of acquiring better specialized technology skills to fully use unfamiliar software products to development online courses. All NVS teachers expressed a desire to take training in the use of such new hardware products as CD-ROM duplicating machines and digital video cameras to support demands from students and parents for greater use of multimedia content in online courses.

One justification used by teachers to support both additional and more specialized professional development was the accelerating pace of innovation surrounding the Internet. As Darren remarked,

> *In terms of keeping current with the technology you have got to put in the time. And it changes so rapidly that you have to put in a lot of time if you are just going to keep up to speed with what is going on and with the many developments.*

Darren also stated that while first-year teachers had unique needs in acquiring basic skills, the need to keep technologically current was a never-ending requirement. He elaborated on this by citing his experience teaching online and the excitement he felt in attempting to keep pace with new technology trends:

> *I can see in the first year as you're developing new materials, you're certainly putting a lot more hours in terms of the developmental side of it. I'm not one to try something new, and if it works, then I'm happy, and that's the way I'm going to go with it for the next five years. Once something works, that's great, but now let's try something new. That's just more my nature. But what a great opportunity. This is almost a perfect environment for that because it does change, and there is no set way of doing things, and there's a lot of room to try.*

Not all online teachers found existing professional development opportunities particularly helpful in keeping pace with the changing nature of the Internet. For a majority of the teachers, the traditional inservicing opportunities organized through the Alberta Teachers' Association, its affiliated Specialist Councils, or the Regional Professional Development Consortia were too basic for their special needs. Bob described how he had received a notice for technology training for teachers from his local school district:

> *We just got a thing over the e-mail saying that they're giving an inservice on how to use Word or something like that in our district, which is great for the people that don't know how to use it, but for us, come on! We want to learn how to do cool stuff. We know how to do the basics, and even some of us more than the basics. We want to learn how to-whatever, Java, Quick Time, Authoring, all that kind of stuff. So those are the things that we want to learn, but we don't know how difficult it is. There doesn't seem to be an expert.*

This lack of specialized professional development for online teachers was echoed by George who remarked that, for many online teachers, traditional inservice opportunities were not applicable:

> *When you have PD afternoons in a traditional classroom, you cover some topics like classroom behavior, classroom management, a wide variety of things that are concerns to a classroom teacher. Those particular topics are irrelevant to us because that is handled in a very different manner, but we have topics that are very specific to our method of teaching. And so those are always the areas that we want*

> *more time to develop, because nobody's out there developing them. If you think of a teachers' convention, they have their topics. We can go to the teachers' convention and say, 'Yes, that's interesting, but you haven't addressed any of the topics that we have here.'*

Informal Support Networks

The need for specialized inservice education for online teachers resulted in the development of informal support systems within each online school. Bruce described the informal support system at MVS in these words:

> *It's part of being a teacher at MVS. We will have an orientation for teachers before the year commences. Professional development is a minimum of one day a month where we have staff meetings, but in May we're going to have three. It's not a lack. Really, I don't feel it is, and yet other teachers are saying, "We need to meet more often." So what we are doing for next year is, we are setting up what I guess I would term a high-end multimedia work-station[at the school offices]. What we're hoping to have is additional software on that machine to allow the teachers to start using multimedia in their lessons. This won't happen overnight, and it won't happen by the teachers just saying, "Here is the software." I see that as an evolving role or function that I'll be performing with Darren and George, so that the teachers will be coming to learn how to use this new technology.*

George reiterated how teachers at MVS used peers to meet the need for inservice education about new ways of using technology:

> *We're always asking for more personal development time, so that teachers can help each other when somebody has discovered something. We've talked about audio files. Dave will show us how he's currently using audio files. Or if there's a new way of sending out a test, then all of the technology that we are using for testing has been developed by teachers, so we share that information with each other.*

While the development of the informal support systems among teachers went some way towards addressing their most pressing technological needs, teachers were pessimistic that there would be a solution to the call for inservice education directed towards instructional design and online pedagogical needs. Many teachers lamented the lack of available literature concerning online teaching generally and K-12 online education in particular. As a result, many teachers felt they were required to "invent" online education.

Market Aspects

Throughout the data-gathering process, a market theme emerged which seemed to shape many of the perspectives that teachers had of their own professional practices and of online education in general. The notion that online education existed within a "competitive environment" where market forces combined to pit one online school against another was shared by all interviewees. This impression that online schools were competitors was reinforced by (a) government policies (Chapter 1), (b) parental choice, and (c) the technological environment upon which online education relied. These market aspects combined to flavor teachers' responses to questions about online education. As one teacher suggested, "*my job depends upon the success of this online school and I am working as hard as I can to help it succeed.*"

Market Forces and Parental Choice

In recent years, parental choice has been an important aspect of educational reform efforts within Alberta. Parental choice has been a hallmark of government policy and Alberta Learning has guaranteed parents the right to enroll their children in any school or any school jurisdiction in Alberta. To support parental choice, government policy has ensured that provincial funding will be made available to the school jurisdiction in which the child is enrolled as of September 30 of each school year. For students taking senior high school courses, school jurisdictions are funded on a credit and course formula regardless of where a student has enrolled.

The combined effect of these efforts has been to provide an incentive for online schools to seek out students from across Alberta and to target those parents and students who would most directly and quickly benefit from an online education (e.g., rural, small school, and home schooling). Marketing programs had been undertaken by all four online schools in this study. These programs have resulted in schools such as MVS attempting to market itself as a school where "family values" are emphasized and where parents can be assured that their children can attend school free from the many of the "safety issues" confronting students in "traditional" schools.

NVS has also engaged in marketing itself to students from remote locations and to students from private Christian schools which, due to their size, cannot offer a compete range of courses to all students. Teachers were constantly aware of the need to attract and retain online students. Also, the need to differentiate online programs and services was often used as a justification by online teachers for extending their workday to develop online content that would become a component of the marketing efforts of the online school. Online school recognized that where parents were empowered to make choices, and that such choices could easily include students from across Alberta.

Market Forces and Technology

Online education exists within an environment where space is no longer relevant, according to Bruce and Bob. Students can attend school from "anywhere." Online students need only an Internet connection and a computer to attend school.

Many of the interviewees pointed out how technology had radically altered their views concerning teaching, learning, and place as well as the traditional relationship between education, geography, and time. Students could attend whichever online school they chose, and potentially could transfer between online schools each year. Students could no longer be "*taken for granted*" according to teachers. Instead, technology had empowered students and parents to make decisions about schooling outside of the need to think about "place" and as importantly change their minds with fewer consequences than if a student were attending a neighborhood school. The Internet and its ability to break the bonds between geography and education had created, according to teachers, a " *free market*" for education.

Darren described the effect that technology had had in shaping the emerging market for education:

> *Schools were a protected environment because they had a protected market. Kids couldn't walk longer than an hour to school or so many miles, and so every student in that area, within that geography, went to that school, whether they were happy or not. Now technology is changing school [choice].*

Teachers' Responses to Market Forces

However, the emphasis on attracting students and retaining students had created an environment of "*winners and losers*" according to the teachers. While some teachers welcomed the chance to compete for students, not all teachers shared this view. Elsie recounted how she had been told by district administrators that only a few online schools would survive:

> *We were told pretty much that not everybody was going to survive. And these other guys come from a different perspective in our group in that they only have one or two classes, and so if this doesn't work, they just go back to their classroom. But I got hired specifically for this [online education], and so if it doesn't work, I'm looking for another job.*

One result of this competitive environment had been to create a feeling of "protectiveness" among online teaches towards their schools and their colleagues. John described how market forces had reinforced a team spirit among NVS teachers. John also suggested that market forces had created an impression that individual professional practices directly contributed to the success and survival of the online school:

> *The fact is that online is so new and in some ways quite competitive, and so each of us is concerned about the look and feel of the whole school. Successes are being shared, The failures also are shared and that is a concern, and so that also enhances the need to be a team.*

While teachers at individual schools spoke about their sense of team and of solidarity with their colleagues, this sense of togetherness had not extended to teachers outside their own schools. The introduction of market forces into education had had the opposite effect with traditional teachers. All online teachers reported hearing from colleagues that online education was a means by which the collective rights of teachers could be weakened. This created in some cases strained feelings among online and traditional teachers. The interviewed teachers felt that traditional teachers feared that online education might one day replace or displace them from their current positions. The animosity among traditional teachers to online education had as much to do with the introduction of technology, as it had to do with online education, according to Bruce and Joan. Darren described the fear of traditional teachers:

> *I also find it interesting when I talk about this with other teachers. Sometimes it's a criticism, but I think sometimes it's more based on a fear of the unknown. I've had teachers comment and say, "Is this going to replace what we're doing?" that kind of a fear. I tell them they'd better not ever. I see online education as another means of delivering. It's another choice for parents. But I know a lot of teachers that, because they don't know a lot about what we do, they're afraid of it, I guess. Because they may not have the technology background, it's scary.*

In response to growing fears among rank and file members towards technology implementation, the Alberta Teachers' Association (ATA) had undertaken to develop a policy towards online education. In early 1999, the policy was released. In part, the policy stated that:

> *The Association believes that while online training may be appropriate for adult learning, it is not appropriate for the education of children expected to become responsible, caring citizens in a democratic society. Teachers recognize that there may be special circumstances which prevent particular students from attending their neighborhood school; however, online education cannot replace the richness of face-to-face education with a professional teacher. The Department of Learning should not encourage the use of technology to increase the delivery options of education when the research does not support this method of delivery as an appropriate form of instruction for school-aged children. This trend may also be designed to undermine public education as it exists today and transfer education to the private sector with "teacher-proof" materials that can be delivered by anyone, anywhere, anytime. The Association opposes any efforts to privatize and deprofessionalize education in this manner.*

The ATA position was difficult for online teachers to support. While they felt an important emotional link to the ATA, they were afraid that the position of the ATA could result in the demise of online schools in Alberta. In addition, they also feared that online education and teachers' working conditions could become a issue in local negotiations. This could result in school jurisdictions closing schools because of the ATA demands. The introduction of market forces had resulted in online teachers beginning to feel disconnected from the issues and concerns of mainstream teachers. One result had been for many teachers to call for another organization to serve as an advocate for their interests.

Recent Developments

During the spring, summer, and fall of 1999 several developments occurred concerning aspects of the professional challenges raised by interviewed teachers. Little had changed regarding the major roles and responsibilities for teachers at MVS, SVS, and EVS. In follow-up conversations with teachers, all reported that with each succeeding year teaching online has become easier.

The greatest changes had occurred at NVS. In response to teachers' concerns about stress and insufficient time to adequately develop online courses, administrators at NVS decided during the summer of 1999 to hire "tutor-markers." Tutor-markers are qualified teachers who work from home and are responsible for marking assignments from students, suggesting areas of improvement, and recording the students' marks into a newly developed online database. While the introduction of differentiated staffing has not been free of problems, it has, according to NVS teachers, helped to relieve the stress associated with developing and enhancing courses.

According to the online teachers, technological support still requires a great deal of their attention, but as students have grown accustomed to online education, their need for support has diminished. Greater skill and the improvement in hardware and software were cited by teachers as other reasons why the need for technology support had declined. What is more important is that online teachers and schools have invested greater efforts at developing online tutorial support thought he development of Frequently Asked Questions (FAQ) file to help students. A final reason cited for reduced technology support has been a leveling off of student enrollment which has resulted in fewer new students requiring assistance.

Employee stress continues to be a concern among teachers. In recent conversations with teachers, stress was still an issue but as they had moved from their first to second year of teaching, to some extent stress had diminished. Carol noted that there was now a greater willingness to talk about stress and the ability to share one's feelings about stress had helped many of her staff. Elsie also spoke about her feeling less stressed because of the course development work done last year. She felt that, because she had well-developed courses to begin the teaching year, the stress of attempting to keep one assignment ahead of her students had been reduced.

The organizational challenges of offering specialized professional development still exist. Teachers continue to want more time to acquire new skills. However, expansion of the informal support networks to include teachers from other online schools had assisted some of the teachers in this study. Through opportunities to meet other teachers by attending the 1998 and 1999 Online School Symposia (the annual conference of the Alberta Online Consortium), teachers were beginning to develop an "online community."

Summary

This chapter described five organizational challenges which teachers in this study identified as associated with online education: (a) the changing nature of teaching and teachers' responsibilities, (b) the tensions arising from expanding opportunities to teach from a variety of locations, (c) the pervasive feelings of personal stress, (d) the need for greater access to specialized professional development, and (e) establishment of a "free market" for education.

The changing nature of teachers' responsibilities and the evolution towards a reconfigured teaching profession was described by teachers who were experiencing the changes first-hand. Through descriptions of their day-to-day activities, teachers outlined the many differences between their previous teaching assignments and their present responsibilities.

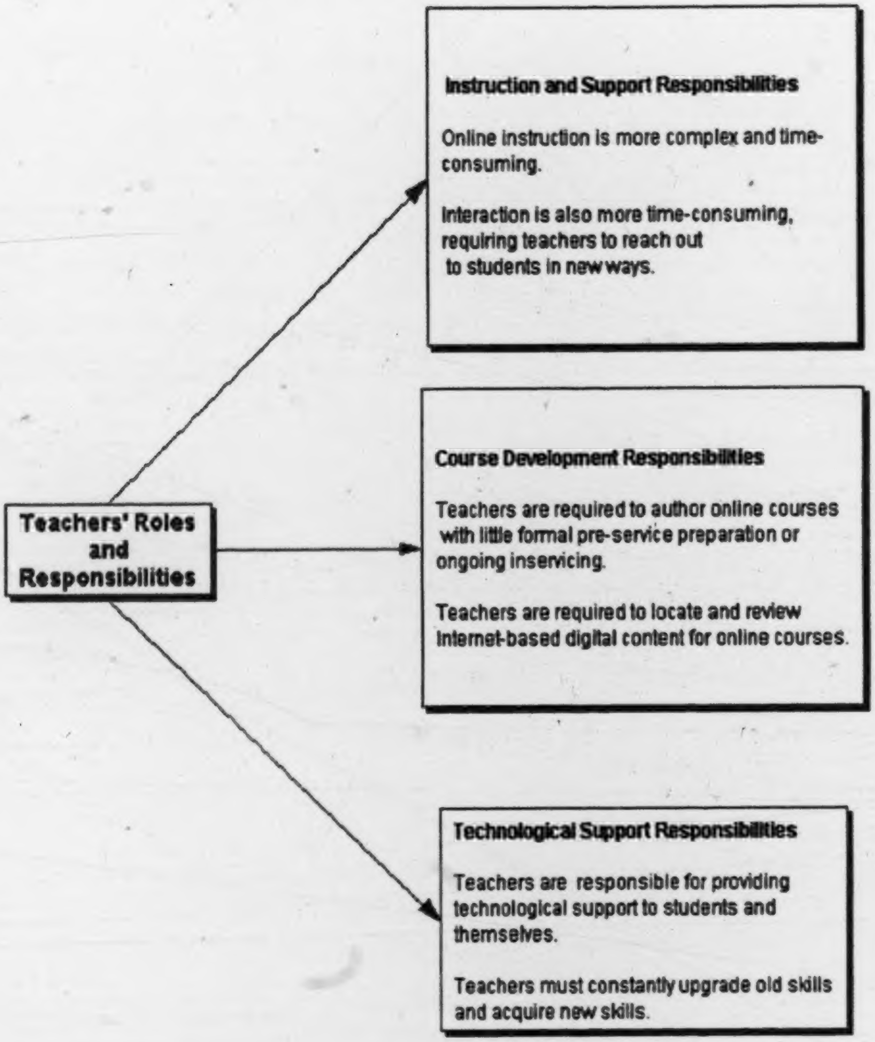
All teachers reported that successful online teaching was characterized by an expansion of the traditional responsibilities of teaching. In addition to the complexity of everyday tasks, they described the many additional responsibilities which now had become expected of online teachers. These new responsibilities include the requirement to develop online course content while also teaching full-time. The complexity of these twin tasks and the expectations to add more to the professional practice of teaching often resulted in teachers feeling stressed and time-deprived. Figure 7.1 depicts the expansion of teachers' roles and responsibilities. Teachers reported describing their day-to-day responsibilities as encompassing three areas: instructional support, course development, and technological support.

Teachers in EVS and SVS taught from offices located within traditional school settings. MVS teachers taught from their homes, while NVS teachers taught from offices. Teachers described a number of workplace related issues including establishing boundaries between work life and home life, feelings of physical isolation, flexibility of time, and issues surrounding teacher supervision. All remarked on how the underlying technology of online education appeared to offer many additional options for teachers to choose where they might work in the future.

Teachers reported various levels of stress as a result of teaching online. Figure 7.2 portrays the three major stressors identified by teachers. The expansion of teaching responsibilities, the "anytime and anywhere" aspect of teaching, and task complexity all contributed to teachers describing higher levels of stress than they had experienced during their previous teaching assignments.

High upon the list of concerns for teachers was the desire for more professional development (PD) and more specialized PD. Figure 7.3 shows three areas where teachers reported requiring additional PD.

Figure 7.4 outlines three aspects of the emerging "*marketplace*" for online education in Alberta. All teachers discussed their mixed feelings about the introduction of "*competition*" into public education and identified three reasons for its emergence. Government policies, parental choice, and the underlying technological environment all contributed to teachers describing how they felt as though their job security was in some jeopardy. A minority of teachers reported that the competitive nature of online education had resulted in feelings of mistrust and suspicion of other teachers from online schools. All teachers expressed concern that the competitive nature of online education may result in education becoming a less caring activity.



Teachers' Roles and Responsibilities

Instruction and Support Responsibilities

Online instruction is more complex and time-consuming.

Interaction is also more time-consuming, requiring teachers to reach out to students in new ways.

Course Development Responsibilities

Teachers are required to author online courses with little formal pre-service preparation or ongoing inservicing.

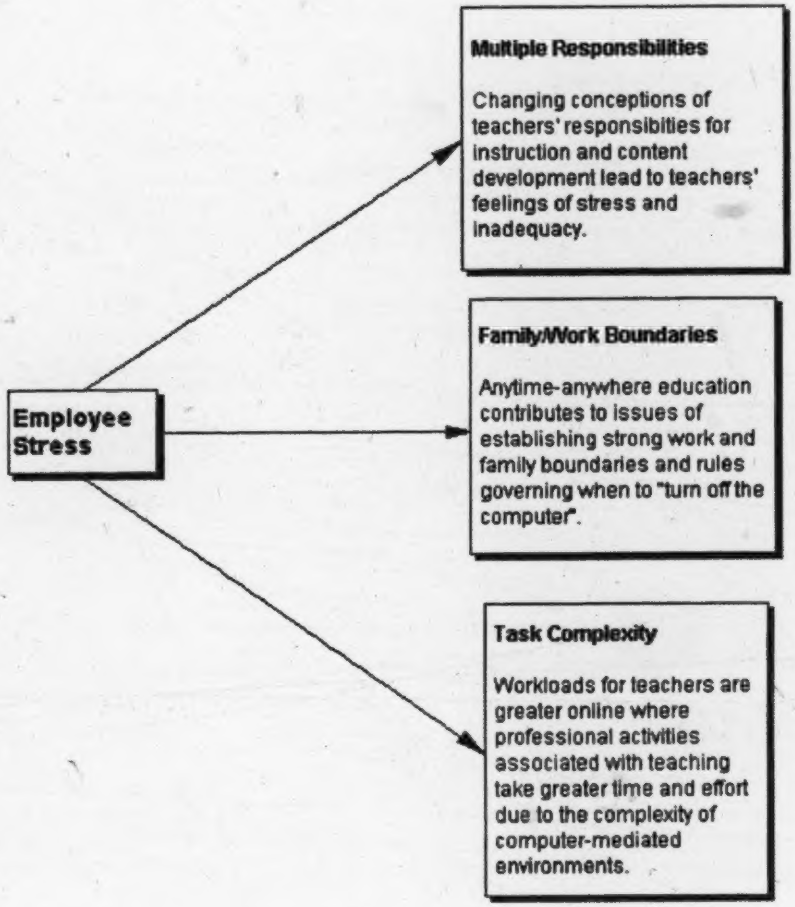
Teachers are required to locate and review Internet-based digital content for online courses.

Technological Support Responsibilities

Teachers are responsible for providing technological support to students and themselves.

Teachers must constantly upgrade old skills and acquire new skills.

Figure 7.1. Teachers' roles and responsibilities.



Multiple Responsibilities

Changing conceptions of teachers' responsibilities for instruction and content development lead to teachers' feelings of stress and inadequacy.

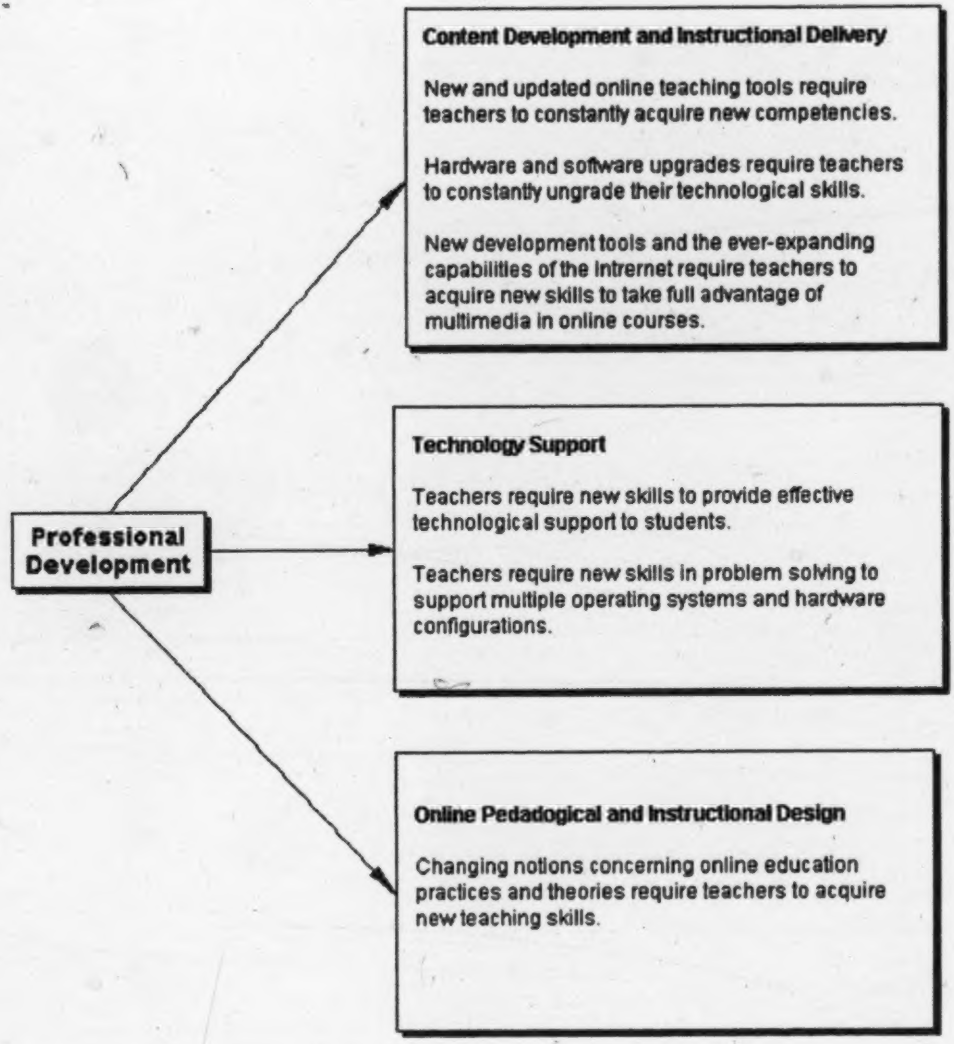
Family/Work Boundaries

Anytime-anywhere education contributes to issues of establishing strong work and family boundaries and rules governing when to "turn off the computer".

Task Complexity

Workloads for teachers are greater online where professional activities associated with teaching take greater time and effort due to the complexity of computer-mediated environments.

Figure 7.2. Employee stress.



Professional Development

Content Development and Instructional Delivery

New and updated online teaching tools require teachers to constantly acquire new competencies.

Hardware and software upgrades require teachers to constantly ungrade their technological skills.

New development tools and the ever-expanding capabilities of the Intrernet require teachers to acquire new skills to take full advantage of multimedia in online courses.

Technology Support

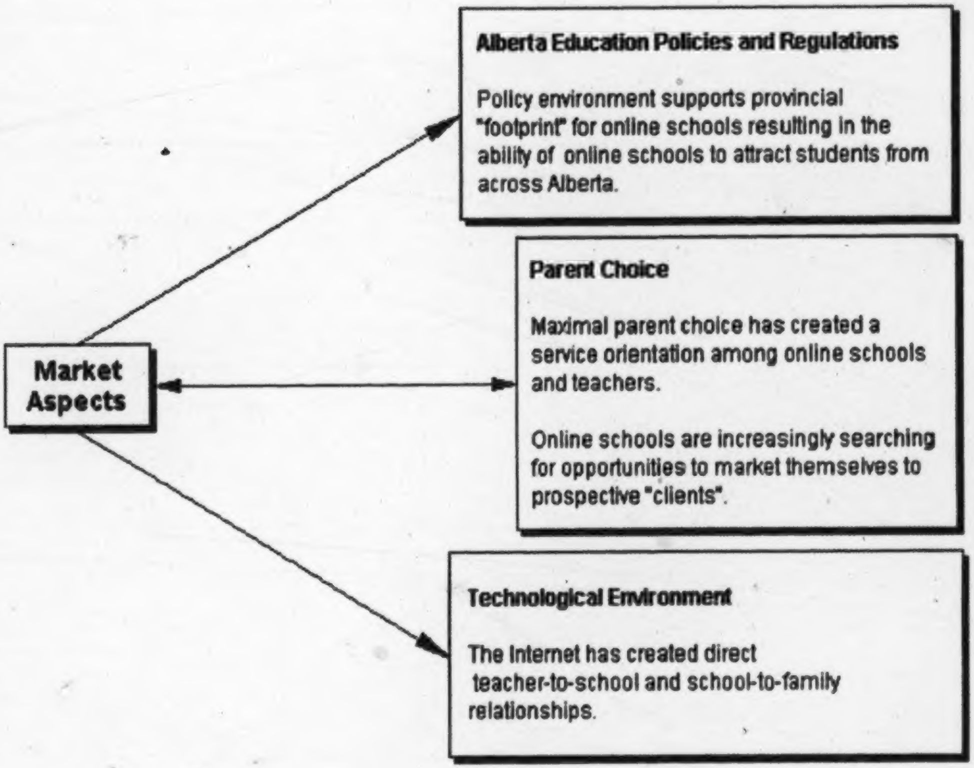
Teachers require new skills to provide effective technological support to students.

Teachers require new skills in problem solving to support multiple operating systems and hardware configurations.

Online Pedadogical and Instructional Design

Changing notions concerning online education practices and theories require teachers to acquire new teaching skills.

Figure 7.3. Professional development of online teachers.



Alberta Education Policies and Regulations

Policy environment supports provincial "footprint" for online schools resulting in the ability of online schools to attract students from across Alberta.

Parent Choice

Maximal parent choice has created a service orientation among online schools and teachers.

Online schools are increasingly searching for opportunities to market themselves to prospective "clients".

Technological Environment

The Internet has created direct teacher-to-school and school-to-family relationships.

Figure 7.4. Market aspects of online education.

Chapter 8

Discussion, Conclusions, and Recommendations

Introduction

This chapter begins with an overview of the study, the methods used to gather research data, major findings, and themes which arose from the findings. The five thematic discussions do not repeat in detail the findings contained in Chapters 4-7. However, the themes do contain my interpretation of the views of online education as developed from the comments of the 13 online teachers in this study. Recommendations for practice and for further research are presented in relation to the literature from distance education, online education and instructional design. The chapter concludes with personal reflections about the current state of online education.

Overview of the Study

Online education only emerged as an educational option less than a decade ago. Since 1995, 23 schools in Alberta have offered options for online education. Within Alberta, the emergence of online education has occurred against almost a century of distance education provisions. Growing from a simple request from an isolated farm family for home schooling lessons for its children in 1923, distance education has expanded substantially.

Radio, television, audio-cassettes, and radio were adopted to enhanced educational opportunities for distance education students. (Rosen, 1968). Today CD-ROM, video-cassette have been used to provide educational opportunities for students at home.

Today, interest is increasing in online programs as a means of meeting the needs of remote, home-schooled, or disparate students for whom attendance at site-based schools presents difficulties. Unlike other forms of distance education, online education depends on network technologies for communication. While current forms of online education have been heavily influenced by the application of network technologies to teaching and learning, how the metamorphosis from traditional correspondence education to online education has occurred and how this has affected the lives of both teachers and students remain unclear.

The general purpose of this study was to describe teachers' perceptions about online education in Alberta. The central research question of this study was stated as follows: What can be learned about online education from examining the work experiences of online teachers in Alberta? These six specific research questions guided the study:

1. What are the experiences of teachers who are teaching online?
2. How do teachers understand these experiences in terms of their professional lives?
3. What content and instructional choices do teachers make concerning teaching online and why do they make these choices?
4. How do online teachers view their responsibilities for development of online courses?
5. What instructional patterns (for example, group, individual, or parent-mediated) are associated with online education?
6. What issues and tensions emerge from teachers' involvement in online education?

Thirteen teachers from four online schools in four different school systems were approached by e-mail to participate in this study. The selection of teachers was based upon similar program infrastructures of schools to provider, institutional support, willingness to participate, length of online teaching experience, orientation to online education, and subjects and grade levels taught. Onsite visits were arranged to allow for personal observations. During these site visits, teachers were encouraged to discuss their course materials and to explain their perceptions and practices about the development process. Semi-structured interviews and open questions were used to provide maximum opportunities for interviewer and interviewee to explore meaningful topics of interest to both without the restrictions of preset questions associated with structured interviews.

Data generated throughout this research project were analyzed using perspectives derived from ethnography and narrative inquiry (Denzin, 1997). The use of narrative concerns the construction of knowledge from personal experiences. This study also sought to give "voice" to teachers' perceptions, experiences, and insights into the act of teaching through the analysis of narrative accounts to illuminate how teachers understood the act of "teaching" online (Clandinin and Connelly, 1990; Poklinghorne, 1995) and based on grounded theory techniques which helped the researcher interpret the data rigorously and in sequence. Analysis was made less onerous by the use of computer-aided qualitative data analysis software, an approach supported by Kelle (1995).

Ethical concerns in this research project involved participants, privacy, consent, respect, and safety. This study met the University of Alberta guidelines for research by ensuring that participation in this study was voluntary, that participants had clear knowledge that they could withdraw at any point in the study, and that participants had the right to privacy, and confidentiality. Pseudonyms were used to represent the online schools/programs and the research participants in reporting the findings of this study.

Permission was sought from school jurisdictions to conduct research involving their online teachers. Relevant procedures to ensure trustworthiness were employed. Member checks (Miles and Huberman, 1994) were conducted to ensure that participants had final approval over research data collected, and that they had the opportunity to withdraw from this research project at any time. Trustworthiness was ensured by asking respondents to review transcripts, declaring personal biases and practicing reflexivity, using a variety of formats for data collection and establishing audit trails.

Major Findings

Findings in relation to each specific research question are not specifically addressed in any one chapter because of the overlapping nature of the findings and their interconnectedness to various online topics.

Findings for Specific Research Question 1, "What are the experiences of teachers who are teaching online?" pervade Chapters 5-7. On one hand, teachers characterized their online teaching experiences as a struggle to recapture the "*certainty*" they felt about their personal teaching practices before moving from face-to-face teaching to online teaching. On the other hand, all teachers described the excitement of pioneering a new form of education and how it had rejuvenated their interest in teaching by presenting them with new and exciting challenges. For all teachers the experience of teaching online produced feelings of anxiety, fear, exhilaration, and personal satisfaction at meeting the needs of students using new common technologies.

Findings in relation to Specific Research Question 2, "How do teachers understand these experiences in terms of their professional lives?" are contained in Chapters 4-7. Teachers spoke about "*making sense*" of their experiences through the personal lens of previous successful teaching experiences. Interviewed teachers characterized their understanding of online education as originating with their past teaching experience and their personal search for ways to apply previously successful practices to new assignments without losing what they considered the "*essence*" of their personal teaching philosophies. Finally, teachers expressed their frustration and feelings of bewilderment when confronting the many new tasks and responsibilities of teaching online in the absence of a theoretical or practical professional preparation to assist them.

Findings about Specific Research Question 3, " What choices do teachers make concerning teaching online, and why did they make these choices?" are embedded throughout Chapters 5-7. For all interviewed teachers, decisions about teaching, learning, and professional practice were based upon a myriad of factors. Time, teachers' backgrounds, school-based resources, technology, personal knowledge, and opportunities for professional development all influenced teachers when required to make pedagogical choices. In addition, teachers based many professional judgments upon the "*best interest of students*" and the notion of equality and "*equal access for all.*" Both of these philosophical principles concerning the development of course content pervaded teachers' choices concerning what form course content should take. The issue is discussed in Chapters 5 and 6.

The findings in relation to Specific Research Question 4, "How do online teachers view their responsibilities for development of online courses?" are also discussed throughout the findings chapters. However, specific references to content development are included in Chapter 5 and to a lesser extent in Chapter 6. Teachers viewed their newfound responsibility for authoring online courses as quite stressful. The sources of their stress are outlined in Chapters 5, and 7. For first-year teachers, the necessity to develop online courses often involved a search for practical recipes or blueprints which they could follow while developing course content. This especially applied to teachers who were authoring online courses for the first time. Teachers also reported seeking out guidelines concerning the inclusion of multimedia content into online courses. All teachers reported struggling with content development issues in an environment where rapid technology innovation was creating new options for online teaching and learning on a seemingly daily basis but which students might not be able to access.

With respect to Specific Research Question 5, "What instructional patterns (for example group, individual, or parent-mediated) are associated with online education?" Teachers described their instructional patterns in relation to interaction, course content, assessment, and the desirability to form partnerships with parents to support the teaching-learning process. Most were using individualized instruction and all reported struggling with adapting past instructional practices to their current situations while also searching for improved models to exploit the power of the computer to enhance student learning.

Findings in relation to Specific Research Question 6, "What issues and tensions emerge from teachers' involvement in online education" pervade Chapters 4-7. Teachers reported that, where tensions emerged or issues arose, these were often a result of "*pioneering*" a new "*form*" of education. The sense of creating something new suffused teachers' descriptions of new lives online. With each change in teaching responsibility, teachers reported new issues and challenges with which they were required to come to terms. Yet, when seen from the distance of an outside observer, and from follow-up discussions with a majority of the 13 interviewed teachers, the chief issue for teachers was to set realistic expectations. For many teachers, the drive to "*do it all*" required them to set personal and professional boundaries about what they could achieve in a finite amount of time. This concern about the connection between time and task completion is integrated in the last theme in this chapter entitled "Time Pressures."

Major Themes

Online education is attracting attention as a viable educational option within Alberta and across Canada. The research base from which decisions about online education are made by teachers is small. This thesis built upon earlier research (Haughey, 1990; Haughey & Muirhead, 1999; Wynne, 1997) concerning the convergence of distance education, educational reform, and the application of computer technology to teaching and learning. Therefore, discussion of the themes reflects the nature of online education where "*everything is related to everything else.*" The major themes arising from this research are evolution of tasks and responsibilities, convergence, attitudes towards technology, relationship with others and time pressures.

Evolving Nature of Tasks and Responsibilities

The first theme that emerged from an analysis of the data concerned the evolutionary aspects associated with online education. The terminology of "evolving nature" is purposefully used to denote the addition of new tasks to the professional responsibilities and the equally important altering of traditional tasks associated with teaching to become more compatible with the new landscape of online education.

While the notion of evolution captures the day-to-day realities of teachers' lives, the accompanying companion to evolution, "extinction," was not evident to online teachers. Instead, teachers perceived that online education had a diversity of tasks that had proliferated, thereby creating a crowded and intensive landscape in which they taught. The notion that online education often resulted in the addition of new tasks and responsibilities to teaching practices has been previously documented in higher education environments by Noblitt (1997) and DeSieno (1995). They suggested that one reason for poor faculty adoption of information technology was that, for many faculty, technology was seen as more, not less, work. Anecdotal evidence arising from personal communications with professors at the University of Alberta suggested that the notion of online education as including additional responsibilities rather than a substitution for existing work-related tasks had slowed the adoption of new online instructional tools. The addition of new responsibilities within K-12 online education is best illustrated by the addition of course development to the normal expectations held for teachers. Teachers were expected to develop course content in a digital environment where the new skills and innovative pedagogical considerations were required.

The teachers interviewed suggested that the single greatest change in their professional lives was the expectation that they author online courses in addition to full-time teaching responsibilities. This was particularly stressful for teachers in their first year of online teaching where the necessity of developing new courses was most acute. Teachers reported that the demand to create online courses was unlike their previous practice of creating instructional material for classroom use in several fundamental ways. The frustration associated with the development of online educational materials--where existing resources were scarce, where creating these materials required expert levels of technological skills, and where developing comprehensive educational environments was expected, without previous pre-service or recent inservice training to provide models or blueprints--engendered feelings of personal and professional inadequacy.

For all online teachers the notion that teaching would now involve new considerations about the "artifacts" of instruction was a concern. The act of teaching online using new digital technologies has made the creation of an educational object easier and has raised issues about the ownership of such work. Concerns about intellectual property which challenged established practices where teachers created, used, and carried their educational content from position to position were commonly expressed. Moreover, teachers felt able to share this material with colleagues without seeking permissions or copy releases from employers. However, according to a recent report by The Node Learning Technologies Network (1999), in an online environment teachers are increasingly faced with seeking copyright release for existing educational content available on the Internet and negotiating with their employers concerning the ownership of their online courses. The tasks of researching copyright and establishing future ownership of courses are new in K-12 education. With the expansion of online education those employed as online teachers will be required to establish new protocols and practices concerning what they can use and cannot use in online courses and what rights they have concerning the educational materials they develop while employed as online teachers. For many teachers in this study, copyright was another detail they now needed to attend to, whereas previously the copyright issues had been ignored.

In addition, teachers reported that the evolution from classroom teaching, where they had utilized body language, oral communications, and teacher-student relationships to manage the learning process (Jones & Jones, 1998), to one where they were required to "rethink" and often unlearn past practices, had created feelings of uncertainty reminiscent of novice rather than experienced teachers. The feelings of inadequacy supported the observation by Drucker (1994) who stated that the greatest challenge associated with change and the integration of information technology into the modern organization was the struggle by individuals to unlearn past successful practices. For a majority of teachers, the move to online teaching had been a return to their past as well as a journey to their future, an idea expressed by Emerson and Hunter (1998).

One notion which online education challenges is the idea of teacher as craftsperson. Within the traditional face-to-face environment, teachers have been called upon to undertake all the related tasks of planning instruction, providing instruction, monitoring learning, offering motivation when needed, and designing and administering assessments to validate learning that had taken place. The introduction of technology to online teaching and learning where educational content increasingly takes the form of knowledge objects (separate and discrete components of a course, module, or unit) has opened up the possibility for differentiated staffing where teaching might be disassembled into discrete tasks. Some teachers might be responsible for creating knowledge objects and other online resources while other teachers might concentrate upon the instruction and delivery of online courses. Still other teachers might concentrate on the task of assessing student progress and providing feedback to students and their parents. In some respects, online teaching presents educators with an opportunity to become more expert in the pedagogy of teaching. Soder (1991) suggested that the recognition of teaching as a true profession would only occur once the tasks of teachers were considered so specialized that the general public would be unable to engage in them. Moreover, as the responsibilities and tasks associated with traditional teaching become "unbundled", there are serious implications for the manner in which funding is allocated.

Bates (2000) suggested that the costs of teaching with technology altered established fiscal allocations. The development of multimedia based educational content is a fixed cost which can be spread over large numbers of students. Although the cost of providing instruction is variable in that more students require additional instructional staff, the cost of the materials do not increase. Within the K-12 environment, this recognition that funds must be allocated for the development of multimedia content has been a driving force in shaping recent government policy. The Learning Technologies Branch of Alberta Learning is allocating funds for the development of educational objects which can be used by both teachers in online education and increasingly by teachers in traditional settings. The recognition that content has wider application has also been an important aspect of new funding for online education content initiatives in Alberta (personal communication, Garry Popowich, Director Learning Technologies Branch and Dr. Donna Smith, Executive Director, Curriculum Branch, Alberta Learning). That the allocation of educational funds at the school level can also be transformed by increasing teacher expertise is evident at NVS. In April, 2000 NVS sought contracts with the private sector to develop educational content based upon specifications identified by online teachers. Rather than expecting teachers to develop multimedia content, NVS teachers are engaging in the research and design of multimedia components for online courses. This initiative is but one example of the evolving tasks and responsibilities which may be expected of online teachers.

The evolution of tasks was also evident in teaching practices where teachers struggled to recreate ways and means to meet their traditional concerns for building relationships with students thereby ensuring that students were continuously motivated, while also continually creating opportunities for students to successfully demonstrate their new skills and attitudes. Teachers were constantly searching for new ways to adapt their traditional skill sets to their innovative online environment. The search by online teachers for new ways to apply technology to learning and teaching was supported by Laferriere, Breuleux, and Bracewell (1999) who suggest that the central challenge which technology presents is the requirement to "reconceptualize learning and teaching" (p.2).

Teachers also faced new requirements to adapt to a technology-rich environment where most teaching and learning practices were mediated by the use of computer technology. As a result, teachers faced the need to acquire new skills to survive in the online educational environment. The acquisition of new skills related to use of new hardware and software used to create educational materials, or fresh skills needed to employ integrated online instructional software packages, or new competencies in diagnosing and solving students' technological problems. Teachers described feeling as though they were on an evolutionary treadmill constantly trying to evolve into a new species which could adapt to its new environment while at the same time fearing that they might fail and die off. According to teachers, the need to acquire survival skills was best met through enhanced professional development opportunities.

The need to obtain new skills for emerging technologies and new knowledge about pedagogical theory and its application to an online environment resulted in a universal demand by teachers to have professional development considered as a core function. Teachers believed that professional development should be woven into their teaching responsibilities thereby resulting in greater time and resources being devoted to continuous learning by online schools. They compared this need to one of survival, where, without the constant upgrading of their professional knowledge base, the pace of evolutionary change would soon overtake them resulting in their becoming extinct or at best being overtaken by the more "*fleet of foot*."

Convergence

The theme of convergence arose from analysis of the data; it was not apparent during onsite observations or interviews with teachers. The term "convergence" is used here to imply a comparative quality involving movement to or from a particular starting point. Convergence is used to denote a "narrowing of a gap," or of a "coming together" where thoughts, ideas, and functions begin to lose their separate identity and thereby becoming more alike. One concrete example of how convergence has begun to affect the realm of information technology has been the convergence of television with the computer or the telephone with the Internet. Both are moving from "stand alone" entities into a new product category where each retains its core functions but offers enhanced functionality through convergence (Gates, 1999; Tapscott, 1996). Convergence also requires access to and knowledge about complete data sets to make accurate comparisons possible. Consequently, convergence is less well recognized until after data have been gathered and reflected upon.

The convergence of online education as a theme includes four aspects: (a) the move to adopt integrated online instructional packages; (b) the adoption of shared instructional design models within schools and between schools; (c) the move towards incorporating both face-to-face and online instructional options; and (d) the development of online databases for sharing disparate student data.

Online instructional software packages have begun to affect online teaching practices (Goldberg, 1996; and personal communication with Goldberg in January 2000). They provide a common set of instructional tools that teachers may use when planning online. In schools which have adopted common teaching packages--such as WebCT at NVS, First Class at MVS and EVS, and Lotus Notes at SVS--teachers remarked on their efforts to create a common "*look and feel*" among their individual courses. They explained this move towards common course structures as reflecting their desire to minimize the requirement for students to re-learn ways of navigating through online courses. Teachers also suggested that the common environment created by integrated online tools had unintentionally created common instructional design models. One example of this convergence was the development of course glossaries by each online teacher in response to the new capability of WebCT at NVS. Where tools were consistent, teachers reported using them in similar ways.

This convergence of practices had become apparent between different online schools where teachers had begun collaborating on course development. Teachers at MVS and EVS outlined how through close cooperation among the teachers from each school, the development of shared designs models and course content was emerging.

For many teachers, the convergence towards instructional design models was due to the their growing practical experience and newly acquired theoretical knowledge concerning the methods and procedures associated with authoring online courses. Increasingly, teachers were adopting traditional instructional design models found in distance education practices as described by Eastmond (1998) and Kemp, Morris, and Ross (1998) to complement their use of more traditional classroom based models discussed in Chapter 5.

An orientation towards constructivist teaching methods is beginning to build a bridge between traditional teaching methods and online education. This is another example of convergence within educational settings in Alberta. While only two online teachers used the term constructivism during interviews or site visits, they did discuss the implications for students leaning where children are actively engaged in their learning. Teachers spoke about their wish to develop online course materials that would require students to express themselves through authentic activities. They wished to construct learning environments where students would take individual ownership for assignments which incorporated real world problem-solving activities and where students could use the power of the computer to display what they have learned in more ways "*than just text on paper*". Several online teachers observed that technology provided them with a means to develop educational content using a constructivist orientation. They remarked that the real potential of information and communication technology in education was in creating new ways of thinking about how students learned, what activities contributed to learning, the nature of educational content and how it affected learning, the role of social interaction in learning, and consequently how instruction should be planned. The role of technology in creating new opportunities for thinking about teaching was suggested in a US. advisory report prepared by the *President's Committee of Advisors on Science and Technology* in March, 1997. The authors of this report noted that "the real promise of technology in education lies in its potential to facilitate fundamental qualitative changes in the nature of teaching and learning" (p. 18) and that "the student-centered constructivist paradigm may ultimately offer the most fertile ground for the application of technology to education" (p. 20).

Constructivism has considerable implications for online education. Online teachers are questioning traditional ways of teaching and are actively engaging in new ways of planning for instruction. This reappraisal of traditional teaching methods is a result of the introduction of technology and the challenges of creating a learning environment where students are called upon to assume greater responsibility for their learning.

Another development, which portended greater moves towards convergence among course content within Alberta, has been efforts by the Alberta Online Consortium (AOC) to create a shared database of K-12 online course content. Course content has begun to be developed by provincial content development teams based on the Alberta Program of Studies. The content will follow common standards or templates jointly developed with online teachers, AOC members, and the Learning Technologies Branch of Alberta Learning. Teachers suggested that, through ongoing efforts to share existing course content and collaborative development of course content, online education in different schools would become more alike than different over the next few years.

Online education as a separate instructional system of education disconnected from traditional forms of education is beginning to change. The convergence of online education, defined as an environment where teachers and students are separated by distance, and face-to-face education where students and teachers occupy a shared physical space show signs of convergence. Teachers reported occasions when they would meet with and tutor students at school offices or during callbacks. For teachers at EVS and SVS, the convergence between online and face-to-face was more established due to their physical location within a local high school. They reported using school facilities to augment their online teaching. Recent announcements by NVS and MVS to include additional space to allow teachers and students to meet suggests that the barriers between online education and face-to-face education will continue to blur.

Finally, convergence has begun to affect the management of information within online schools. Traditionally, information about students' progress, successes, and failures resided with individual classroom teachers. Knowledge about a particular student was rarely shared with colleagues except through informal communication channels. Personal information, family histories, and past performance statistics were usually placed in paper-based files which followed students throughout their school careers and were located in locked storage cupboards. This "balkanization" of student information among teachers has begun to change within online schools.

In response to the desire by online teachers to reduce their feelings of "*disconnectedness*" from students, online schools have begun to develop and implement integrated online student databases. Discrete data sets from each teacher and the school administration are integrated into an online resource for teachers. The convergence of information from several sources is providing teachers with quick access to students' records about individual student progress about courses, past academic performance, current student marks, communications with parents by all staff members, and any additional information about teacher interventions which have supported student learning. This convergence of information promises to provide teachers with new ways to create a student "learning profile" and to create new knowledge about how to address individual learning needs (Alberta Education, 1995).

Attitudes Towards Technology

All teachers discussed the pervasive role of technology in online education. They held strong views about how technology was used to address student learning and about the potential that it held for individualizing instruction to meet individual learning needs. Teachers' attitudes towards technology involved (a) how technology could support learning rather than how it worked, (b) their frustration concerning the gap between vision and reality, (c) their feelings about being pioneers in the use of information technology, and (d) the potential for technology to create enhanced teaching-learning environments for students.

In explaining their attitudes towards technology, teachers described how they used both hardware and software to develop course materials, how they used technology to create learning environments for students, and how technology facilitated interactions with parents, students, and colleagues. Few teachers discussed the underlying engineering or programming that created the hardware or software which they used. Teachers' attitudes towards technology closely reflected their professional interests. Cuban (1986) suggested that the history of teachers and technology has been characterized as a process where technology, unless seen as adding value to the teachers' lives, was often ignored. The attitude of teachers in this study towards technology clearly supported the view of Moore (1991) who suggested that technology adoption by individuals was often a matter of identifying "*compelling reasons to buy*" embodied in a particular profession or discipline.

The interviewed teachers generally held positive attitudes towards technology. However, their positive attitudes did not preclude teachers from remarking on the gap between their vision and the current reality. Teachers' frustrations with technology focused on a number of irritants. First, they reported disappointment with the reliability of computer technology. All teachers reported unexplained system failures with their computers or with student computers. Problems with student computers were doubly frustrating where teachers were the primary source of technological support for students.

Second, teachers expressed frustration with the difficulties of working with multiple versions of a software package and of providing technology support to students using multiple operating systems. The lack of hardware and software standards resulted in incompatible or unreadable files which required teachers to convert and reconvert files. Teachers wished for greater standardization among hardware and software technology.

A further problem for teachers was the absence of mature integrated content development tools that could work with content delivery software. Teachers expressed frustration with the necessity to master different software tools for developing content. The requirement to master dissimilar software tools contributed to the complexity associated with creating course content. All teachers expressed a desire for a software product similar to the integrated delivery tools in use to streamline the development of online course content.

Teachers also held strong opinions about their roles as pioneers in applying technology to teaching and learning. They made clear their feelings about the unique situations they found themselves in and how they saw themselves as occupying the leading edge of a larger wave of change which would ultimately reshape education. For online teachers, the opportunity to experiment with technology and the opportunity to apply the results of their experiments was a powerful force in motivating them to work the extra-ordinary hours each had described. As John stated during his interview,

> *I see us in the online environment a lot like the pioneers who perhaps first came out to this country. The pioneers were breaking new ground. They did not know how to function because this was a new climate, a new area. They were restricted in the tools that they could have, and so there was a lot of learning.*

Other teachers reinforced the metaphor of pioneering by using descriptors such as "*first-time, new, latest, and unique*" when explaining their professional practices. Their attitudes towards technology were influenced by their desire to create an "*enhanced*" learning environment. They saw technology as a means to address many of the current problems associated with traditional schooling and hoped to use technology to better match instructional styles to student learning styles and to create courses that would increase student motivation. Bork (2000) echoed these observations when he stated that technology will "bring changes in what is learned. Memory is no longer important. Solving problems, encouraging creativity, adapting to change and building intuition take priority" (p. 79). By and large, teachers felt that technology, properly used, could create better, more productive, and more interesting learning environments that could complement existing instructional options.

Relationships With Others

A powerful theme which emerged from teachers' descriptions of their day-to-day teaching experiences was a sense that online education had significantly altered their relationships with others. Teachers constantly remarked on how relationships based upon their previous classroom experiences had changed. For many, "teaching" was seen to be a relationship-building profession. Throughout onsite observations, informal discussions, taped interviews, and follow-up conversations, teachers constantly returned to the theme of relationships and interactions with others.

When asked to reflect upon their interactions with others, teachers described how online education had transformed interactions between themselves and students and parents. They saw relationships as integral to teaching and learning: (a) teaching is about relationships, (b) learning is enhanced where relationships are formed, (c) relationships between teachers and parents are critical to the success of online students, (d) socialization is a shared responsibility between home school and society, and (e) collaboration among colleagues is important to online teachers.

Teachers described teaching in terms of relationships and their efforts at searching for ways to "*get to know their students*." One strategy was asking leading questions when sending out general e-mail messages to students to encourage an exchange of ideas which they hoped would provide them with a better "*sense*" about whom they were teaching. A second strategy was attending to background noises during telephone conversations to gather information about students' home lives (e.g., dogs barking, babies crying, or siblings teasing). Teachers emphasized the importance of forming a mental "*picture of their students*" as emphasized by Palloff and Pratt (1999). The notion of relationships and the attention paid to creating relationships has identified by Picard (1997) as the central challenge of computing in the future. Conversely, teachers employed a number of strategies to provide students with knowledge about themselves. Joan posted vacation photos, while other teachers posted personal pictures and descriptions of themselves within their online courses. In both cases, teachers stated that successful teaching involved building relationships with others. When asked to explain why relationships were important, all teachers shared a belief that student performance was improved when there was a positive relationship between a student and a teacher, as emphasized by Tapscott (1998).

With regard to relationships with parents, teachers suggested that one of the strongest predictors of student success was the interest that parents displayed in their children's education. While this is also true for students in traditional school settings, parents of online students were required to assume greater responsibilities towards the education of their children. Teachers described how important it was to establish a working relationship with parents to share responsibilities concerning student motivation and to monitor student on-task behaviors. When parents were not committed teachers reported that many students performed poorly in online courses. This recognition of the critical role which parents played led all online schools to adopt a policy ensuring that a responsible adult should be present at the student's home during the school day.

The belief that socialization was a shared responsibility between home, school, and society was held by all online teachers. The notion of school as the primary socialization agent in a student's life was rejected by all online teachers. Teachers described the role of schools in the socialization as one where civility was expected and respect was to be shown to others. Teachers rejected the fears of some critics of online education (e.g., Stoll, 1995) that students were being deprived of social interaction. They also did not accept the position of Postman (1992), who, when commenting on the use of the personal computer, wrote that, "In introducing the personal computer... we shall be breaking a four-hundred year-old truce between gregariousness and openness fostered by the orality and the introspection and isolation fostered by the printed word" (p. 17).

Teachers pointed to the amount of time students spent in chat rooms and exchanging e-mail and to the community activities recorded by students in physical education logs as evidence that students were far from socially isolated. Many teachers recounted the many friendships formed among online students as further evidence that "*children were still children*." As Bruce explained, the world which children occupy is a different world than the one he grew up in on a farm. Today, there are many more opportunities for students to meet and form peer group relationships than in his youth. The teachers considered that, for students, online education was about forming relationships even if the relationships were originally formed and mediated by technology.

For online teachers, the freedom to interact with and collaborate on interdisciplinary projects was one of the most rewarding aspects of online education. Most found that the experience of teaching online was associated with new-found personal freedoms to team-teach in a collaborative environment. The notion of belonging to a team where teacher-teacher interaction was as easy as picking up the phone, yelling across an office, or dialing a telephone, or composing an e-mail message was profoundly different from their previous working relationships with colleagues. The absence of responsibilities for routine supervision of students allowed teachers to work together in ways that classroom teaching did not.

Time Pressures

The final theme arising from the experiences of online teachers was the all-encompassing notion of "time" and how the teachers understood their professional activities in terms of how they spent their working time. In terms of time as a resource, teachers spoke about how time affected their perceptions about stress, anytime education, and task complexity.

Teachers' involvement in online education had resulted in heightened awareness about time and professional tasks. When discussing the notion of time, teachers often associated time with stress. For many teachers, the connection between stress and time resulted from perceptions that there was too little time. In an atmosphere where teachers felt overwhelmed with new responsibilities and the necessity to adapt previous teaching practices to a new teaching environment, it was no surprise that for many teachers time had become the most precious of commodities. When the teachers assessed the many adjustments that they had been required to undertake, the greatest had been to personal time management skills. Levine (1997) had noted that a major distinction among and within professions was the temporality of its members. To understand a profession one must understand its members' use of time.

The notion of time and how teachers perceived time was often raised during interviews. One of the significant changes to their teaching day was a sense that they were no longer governed by the clock but by the task. The notion of time and how it had been altered was well summed up by Lightman (1993) who wrote that

> in this world, there are two times. There is mechanical time and there is body time. The first is as rigid and metallic as a massive pendulum of iron that swings back and forth. The second squirms and wriggles like a bluefish in a bay. The first is unyielding, predetermined. The second makes up its mind as it goes. (p. 24)

All teachers reported that they were now required to carefully plan their teaching days to keep pace with the multiplicity of responsibilities they carried including increased numbers of interactions with parents and the challenges of interacting with students on a one-to-one basis. The reality that online education was based upon teachers' interactions with individual students contributed to time pressures. Paulson (1996) suggested that communications technologies facilitated four levels of interactivity in online education--one-alone, one-to-one, one-to-many, and many-to-many. According to Paulson, most traditional education has relied upon one-to-many communication where the education was teacher-centered. This allowed teachers to "broadcast" instruction and to take advantage of planning for interaction where instruction, explanations, feedback, and to a lesser extent, assessment occurred in a group environment. One issue contributing to time pressures felt by online teachers is the reliance upon a one-to-one communication where teachers often repeat instructions and explanations to each student, rather than to a group or class of students. To date, online education has been premised upon the notion that one of the chief benefits is the ability to individualize education for all students. Unfortunately, individualization has contributed to a vastly increased workload where teachers spend much of their time answering e-mail questions from individual students. It is unclear if this is an indication of teachers' preferences or whether it is a function of the state of educational software which has only recently developed reliable tools for asynchronous and synchronous group discussions. How teachers will use new threaded discussion tools in WebCT, or newer versions of First Class to engage students in many-to many activities such as discussion groups, or group learning activities remains to be explored.

The ability to work at all hours had added to the stress of teaching. Teachers felt the loss of the traditional boundaries which had provided structure to their teaching day and outlined the effect that an absence of bells and set class times had on online education. For many teachers, the absence of time-based structures extended to notions about when school began and ended each day. Whether teaching from a home office or from a formal office, teachers described the effect that simply "*turning on their computer*" had upon their notions of work. Teachers expressed the view that, regardless of where they were physically located, once they "*logged on*" to the Internet and connected to their school's server they were "at work." Work was therefore less defined by its physical location and more by mental attention. Teachers could be at work while at home or while out of the office. To be at work meant to be attending to school matters. The "anytime" nature of online education created challenges for teachers to turn off the computer and set boundaries between their home life and work life.

The complexity of the technological and pedagogical tasks that confronted teachers also contained an element of time. As discussed in Chapter 8, the everyday tasks of teaching required greater expenditures of time. Teachers reported how a simple teaching task such as acknowledging receipt of an assignment required many more steps and therefore greater amounts of time to complete. For more complex tasks such as correcting and commenting on student assignments, the time expended was many times greater than face-to-face teaching. As a result, teachers again reported a heightened awareness of time, scarcity, and task completion. Consideration of the themes and general matters that arose during the conduct of the study led to formulation of recommendations which are presented below.

Recommendations for Practice

The following recommendations are offered for consideration by online school district administrators and teachers. They are divided into categories that reflect the topics discussed in each finding chapter.

Recommendations Regarding Professional Practices and Content Development

1. To support teachers in developing online courses and to avoid the duplication of course development efforts among teachers and schools, greater cooperation should occur. To facilitate collaborative course

development, expansion of the Alberta Online Consortium Content Development Teams should be considered.

2. To facilitate the sharing of existing online course content among online schools and educators, a content repository should be created where online educators may place course materials. Furthermore, the content repository should have the capability to monitor content downloads to facilitate compensating individual schools for the use of content owned by school districts.

3. Online teachers, officials from the Learning Technologies Branch of Alberta Learning, and members of the Alberta Online Consortium should seek to develop instructional design models which reflect the developmental and social aspects of students at the K-12 level.

4. A provincial office for researching and negotiating copyright clearance for existing digital content, which can then be shared among all online educators in Alberta, should be created.

Recommendations Regarding Interaction of Online Teachers

1. To support students moving from face-to-face settings to online education, materials should be made available outlining the new responsibilities expected of students and parents. These materials should be distributed to families prior to the initial callbacks held at the beginning of each school year.

2. Additional professional development opportunities should be arranged to address the desire of teachers to enhance teacher-student interaction.

3. In light of the support expressed by teachers concerning the benefits to student learning where online interaction was supplemented by the use of "telephone teaching," all online schools should setup a toll-free telephone line to encourage parents, students, and teachers to contact each other when necessary. Additionally, online educators should investigate the purchase and use of telephone-bridges to support audio-conferencing among students and teachers.

4. All teachers spoke about the benefits of callbacks in establishing relationships with students and parents. In addition, teachers reported the importance of meeting students in a face-to-face environment to "*put a face with the name of their students.*" However, large group face-to-face meetings were less successful as occasions to provide technical training. Consequently, the number of callbacks held each school year should be increased to provide greater opportunities for students, parents, and teachers to interact with each other and to support the creation of online learning communities.

Recommendation Regarding Technology Issues

1. To address concerns raised by teachers concerning the amount of technology support required by students at the beginning of each term, development of online and print-based technological support materials should be undertaken for novice online students and parents. These materials should be sent to families before the beginning of each school year to allow both parents and students to acquire the essential technological skills required to operate online school computers. Such materials would assist in initial technology training programs organized by online schools before the opening of the school year.

2. School and district administrators must address the requirement for online teachers to enhance existing technological skills and acquire new skills. The total number of professional days should be increased to recognize the pace of continuous innovation currently associated with the Internet.

3. To ease the strain experienced by online teachers in supporting multiple hardware platforms and software packages, online schools should move towards standardization of hardware and software.

4. To provide teachers with an expanded set of online tools for instructional purposes, online schools should adopt integrated online "open standard" delivery tools.

5. Moreover, as more online schools move towards adopting common instructional environments, administrators should investigate closer

cooperation about sharing technological infrastructures such as school servers and technical support desks.

Recommendations Regarding Professional Challenges

1. Online schools need to address the stressful conditions reported by teachers in this study. Administrators should assist teachers in establishing realistic workplace goals and reasonable boundaries between family life and workplace responsibilities. Where stress has become overwhelming online schools must be prepared to adjust workloads. This is of particular importance for first-year online teachers or teachers who have substantial responsibilities for developing multiple online courses.

General Recommendation for Teacher Preparation Programs

1. Online education as a component of the public school system is expanding. The number of families and students choosing online education has grown each year in the last four years. However, the curricula of teacher preparation programs have not recognized that teachers may find themselves required to teach online at some point in their careers. Therefore, Alberta's Faculties of Education should include courses in online teaching and the development of online course material. Furthermore, to provide beginning teachers with the practical skills and experience necessary to meet the expected growth of online education, interested student teachers should be placed in online schools at some time during their undergraduate field placements.

Recommendations for Future Research

The following recommendations for further research are suggested.

1. This study was undertaken using a qualitative theoretical orientation. All research orientations contain assumptions, biases, and philosophical positions concerning the nature of reality. The emergence of online education is young and the study of online education is younger still. The study of online schools would benefit from additional research using a variety of perspectives

to begin to build a body of findings which could provide a theoretical basis for decision-making about online education.

2. This study examined teachers' perspectives of online education in Alberta. The perspectives of others touched by online education should also be researched. Such research could include students, parents, and online school administrators who would provide valuable information concerning the impact of online education.

3. Research should be undertaken in other provinces to provide further data on the perspectives of online teachers about online education within their provinces.

4. This study examined the perspectives of 13 online teachers from four online schools in four school jurisdictions. There are currently 20 online schools operating in Alberta with approximately 150 teachers teaching online. Additional research involving larger numbers of teachers is required to provide a wider perspective regarding online education.

5. Throughout this study, teachers described the pace of technological change and professional innovation within the four online schools. Consequently, a continuing need exists to document the changes taking place with Alberta's online school system. Longitudinal studies hold great promise to help provide a better understanding of the changes taking place in the field and to document how changes in technology are affecting teaching and learning practices.

6. Finally, how teachers' perspectives relate to both instructional models and student outcomes is unclear. To date there has been no published research examining student outcomes in online education. Therefore, such research should be undertaken to examine the link between instructional practices and student outcomes. Aspects such as the ways in which interaction may affect student achievement should be included in future research.

Personal Reflections

Online education in Alberta is an emerging field of educational practice which has existed for less than five years. The majority of online schools began operation in 1997 and 1998. The growth in both student enrollment in online educational programs and the number of school jurisdictions offering online education has suggested that online learning opportunities will continue to expand.

Online education is one result of rapidly evolving technological changes resulting from the "marriage" of the silicon chip, the growing capabilities of software programs, and network technologies such as the Internet. Within Alberta, online education arose to meet the needs of students and parents for greater equality of educational opportunities to deal with the recognition that traditional school settings may not be meeting the individual needs of many students and that parental choice and educational options needed to be supported.

The development of online education is part of a larger trend in K-12 schooling where learning will be less dependent on time and place to one that recognizes that learning can occur "anytime anyplace." Recent research for the Commonwealth of Learning (Farrell, 1999) showed that interest in online education is attracting international interest. The chief challenge facing education over the next few decades may to adapt to the possibilities created by rapidly changing technology and its application to teaching and learning.

However, this study suggested that teachers and students will continue to be at the forefront of the changes created by the adoption of technology within educational settings. It clearly pointed out that, while the roles and responsibilities of teachers may be altered in online education, their essential instructional role within the education system will continue. Unlike the views of those critics who fear that online education will "*deprofessionalize education*" (Alberta Teachers' Association, 1999), this study supports the notion that teachers are the key to creating optimal educational environments where students can reach their potential. The dedication of the 13 teachers in this study supports the idea that the teaching profession will continue to thrive within technologically enhanced teaching and learning environments.

Moreover, the concern by critics of online education that interaction between teachers and students or among students is disregarded by teachers did not hold true for the teachers in this study. All described their desire that teacher-student interaction should be regular and ongoing and outlined their plans to create enhanced opportunities for regular and continuing interaction. All teachers shared a perception that positive interactions with students produced enhanced learning outcomes. The criticism that "*online education cannot replace the richness of face-to-face education with a professional teacher*" (Alberta Teachers' Association, 1999) was unsupported in this study.

The main contribution of this study has been to improve the understanding of the professional practices of online teachers in Alberta. Notwithstanding the theoretical constraints of generalizing the perceptions of the 13 interviewed teachers to all online teachers in Alberta, this study provides a detailed description of the emerging environment of online education as seen through their eyes.

However, the rapid emergence of online education and the effect that online education has had upon traditional constructs underpinning educational practices requires additional research. The ability of technology to alter day-to-day practices supports the need for more resources to be directed towards expanding the knowledge base about K-12 online education. I personally believe that advances in technology will substantially alter education in ways that we have not yet contemplated. Consequently, changes in attitudes towards technology among teachers are urgently required. Educators must open their minds to the new possibilities arising from the adoption of technology to address student learning.

Finally, this study would not have occurred without the support of the participants. Their generosity, professionalism, and dedication to the act and art of teaching children will be my most enduring memory of this study. Regardless of how online education will evolve, as long as teachers share the teaching-learning process with children, we can expect that it will have a bright future.

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Appendices

Appendix A

Interview Questions

Interview Questions

The process of conducting semi-structured interviews involves asking broad opening questions and following the lead of the interviewee based upon responses to the opening question. However, while semi-structured interviews are by their very nature open-ended and lacking predetermined "structures," the interview discussion may benefit from the interviewer having some done some prior thinking before commencing an interview (Kvale, 1996). It is with this intent that the following questions have been developed to assist me to anticipate issues which may arise during the semi-structured interview process. The use of headings such as personal background, interaction, assessment, and content development are used below to organize broad areas for questioning and are not meant to determine precise catagories.

Personal Background

How long have you taught at this school?

What courses do you teach?

How long have you been teaching online?

How did you become involved with online teaching?

What attracted you to and/or how did you chose to teach in using online education?

Can you tell me about your formal educational and professional background?

Interaction

What types of technology do you use in your online teaching (example, phone, fax, teleconferencing, videoconferencing, and mail)?

Do you plan for interaction in your online teaching and if so how?

What kinds of interaction occur in your courses and how do they occur (online, offline, telephone, FACE-TO-FACE, callbacks, home visits, regional meetings, chat sessions, synchronous online, group work)? Can you describe some of the interactions which take place in your course?

Does the interaction you do have with students and parents give you a "sense" of the student? Can you get to know your students online?

What kinds of interactions do you have with your colleagues in the online school? Are your interactions with colleagues different from your previous interactions with colleagues in "regular" school setting? If so how?

What kinds of interactions have you had with parents? How are these different from those in your previous teaching assignment?

Assessment

How do plan for assessment in your online teaching? What forms do your assessments take? Can you describe how you plan for and conduct student assessment in the courses you are teaching?

What are the challenges of planning for and conducting student assessment online?

Have you found that you must "rethink" how you conduct student assessment in an online environment?

How much time do you spend marking student work?

Do you individualize student assessment?

Are there technologies which would enhance your teaching which you do not have access to? If so how would you use them?

Content Development

What subjects do you teach?

Is your subject "well suited" to online teaching and learning?

How do you plan for and develop course content for online teaching?

What are the challenges of developing teaching materials for an online environment?

Do you use non-digital resources in your teaching? Do you use paper based-print materials in your teaching and if so how do you integrate the digital and non-digital materials into your course?

Do you use online resources from the Internet in your teaching and if so how?

Do you use digital content resources from commercial publishers or from other organizations (e.g., LTB, LearnNet, and other online programs)?

Do you individualize course content? If so how?

What planning strategies do you use in planning and developing course content?

Has the use of technology for online education enhanced or weakened your teaching?

Appendix B

Curriculum Vitae

Curriculum Vitae

William D. Muirhead

Academic Background

1997-2000 **UNIVERSITY OF ALBERTA** Edmonton, AB

Ph.D. Student, Educational Policy Studies, majoring in Educational Administration and Leadership. Anticipated convocation date November 2000.

1992-1995 **UNIVERSITY OF MANITOBA** Winnipeg, MB

Master of Educational Administration, Project Route

"Personnel Challenges of Demographic Trends Among Manitoba Teachers"

1985-1987 **UNIVERSITY OF MANITOBA** Winnipeg, MB

Pre-masters: Curriculum and Humanities Department

1974-1978 **MCGILL UNIVERSITY** Montreal, QC

Bachelor of Education

Relevant Experience

1999 **ALBERTA ONLINE CONSORTIUM** Edmonton, AB

Executive Director

Responsible for managing the Alberta Online Consortium (AOC) on a day-to-day basis. The AOC is a member-driven organization with 51 Alberta school jurisdictions and 10 postsecondary institutions. The Executive Director provides policy analysis and support and oversees program management for the AOC. The Executive Director maintains communications with Alberta online schools and government agencies.

1998-1999 **ALBERTA LEARNING** Edmonton, AB

Virtual School Consultant

Responsible for support to online programs and virtual schools throughout Alberta. Responsible for Virtual School Symposia November 1999 in Edmonton. Responsible for examining policy implications and recommendations for virtual schools in Alberta. Provided liaison between online organizations and Alberta Education.

1997-1999	**UNIVERSITY OF ALBERTA**	Edmonton, AB

Department of Educational Policy Studies

Instructor: EDPS 310, Managing the Learning Environment 1997-1999

Developed online materials and support for EDPS 310 throughout the secondary teacher evaluation program.

Researched and co-authored EDPS 501, Distance Education Systems, May-August 1998.

1988-1997	**CHARLESWOOD JUNIOR HIGH SCHOOL**	Winnipeg, MB

Teacher, Art, Social Studies, Business, and Computing.

Publications

Muirhead, W. (1998). *A proposal for the formation of the Alberta Online Consortium*. Edmonton, AB: Alberta Education.

Haughey, M., & Muirhead, W. (1999). *Common practices in online learning: A best practices study of integrating technology in learning*. Edmonton, AB: Alberta Education.

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Courses Completed, University of Alberta

81-723	Technology and Education, University of Manitoba
MDDE 603	System Design in Distance Education
EDAL 611	Research Methods I
EDAL 612	Research Methods II
EDAL 625	Administrative Behavior I
EDAL 626	Administrative Behavior II
EDAL 635	Organizational Theory I
EDAL 605	Field Placement
EDAL 606	Faculty Development